DOCUMENT RESUME

ED 156 512 SE 024 490

TITLE	Case Studies in Science Education, Booklet XIV: Survey Findings.
INSTITUTION	Illinois Univ., Urbana. Center for Instructional Research and Curriculum Evaluation.
SPONS AGENCY	National Science Foundation, Washington, D.C.
PUB DATE	Jan 78
CONTRACT	NSF-C-7621134
NOTE	136p.; For related documents, see SE 024 476-491; Contains occasional light type
EDRS PRICE	MF-$0.83 HC-$7.35 Plus Postage.
DESCRIPTORS	Curriculum; *Educational Research; *Educational Trends; Elementary Secondary Education; *Instruction; *Mathematics Education; *Science Education; *Social Sciences; Surveys
IDENTIFIERS	*National Science Foundation

ABSTRACT

This booklet is the fifteenth of a series of 16 booklets that together describe and present findings for a study which involved field observations and a survey of science teaching and learning in American public schools during the school year 1976-77. The study was undertaken to provide the National Science Foundation with a portrayal of current conditions in K-12 science classrooms to help make the Foundation's programs of support for science education consistent with national needs. Eleven high schools and their feeder schools were selected to provide a diverse and balanced group of case study sites. One field researcher was assigned to each site and instructed to find out what was happening and what was felt important in science (including mathematics and social science) programs. To confirm findings of the ethnographic case studies and to add special information, a national stratified-random-sample of about 4,000 teachers, principals, curriculum supervisors, superintendents, parents, and senior class students were surveyed. The purpose and method of the survey along with the survey findings and corroborations are presented in this booklet. (MN)

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Booklet XIV
Survey Findings

SE 024 490

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Case Studies in Science Education
A project for the National Science Foundation
conducted by CIRCE and CCC
270 Education Building
University of Illinois at Urbana-Champaign

CASE STUDIES IN SCIENCE EDUCATION

BOOKLET XIV

Chapter 18

SURVEY FINDINGS AND CORROBORATIONS

Center for Instructional Research and Curriculum Evaluation
and
Committee on Culture and Cognition
270 Education Building
University of Illinois at Urbana-Champaign

January 1978

"The material in this report is based upon work supported by the National Science Foundation under Contract No. C 7621134. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the National Science Foundation."

The Project

Case Studies in Science Education is a collection of field observations of science teaching and learning in American public schools during the school year 1976-77. The study was undertaken to provide the National Science Foundation with a portrayal of current conditions in K-12 science classrooms to help make the foundation's programs of support for science education consistent with national needs. It was organized by a team of educational researchers at the University of Illinois.

Eleven high schools and their feeder schools were selected to provide a diverse and balanced group of sites: rural and urban; east, west, north and south; racially diverse; economically well-off and impoverished; constructing schools and closing schools; innovative and traditional. They were finally selected so that a researcher with ample relevant field experience could be placed at each. To confirm findings of the ethnographic case studies and to add special information, a national stratified-random-sample of about 4000 teachers, principals, curriculum supervisors, superintendents, parents, and senior class students were surveyed. Survey questions were based on observations at the eleven case-study sites.

The field researchers were instructed to find out what was happening, what was felt important, in science (including mathematics and social science) programs. On site from 4 to 15 weeks they were not required to coordinate their work with observers at other sites. Questions originally indicated important by the NSF or identified early in the field were "networked" by the Illinois team. Efforts to triangulate findings were assisted by reports of site visit teams.

Each observer prepared a case study report which was preserved intact as part of the final collection, and later augmented with cross-site conclusions by the Illinois team. The cost of the study was just under $300,000, taking 18 months actual time and about 6 research-person years to complete.

In the principal findings it was noted that each place was different in important ways, that each teacher made unique contributions. Nationally we found that science education was being given low priority, yielding to increasing emphasis on basic skills (reading and computation). Still, the CSSE-high-school science faculties worked hard to protect courses for the college-bound, with many of these courses kept small by prerequisites and "tough" grading. Only occasional efforts were made to do more than "read about" science topics in most of the elementary schools. Although ninth-grade biology and eighth-grade general science flourished, general education aims for science instruction were not felt vital at any level. Seldom was science taught as scientific inquiry--all three subjects were presented as what experts had found to be true. School people and parents were supportive of what was chosen to be taught, complaining occasionally that it was not taught well enough. The textbook usually was seen as the authority on knowledge and the guide to learning. The teacher was seen to be the authority on both social and academic decorum. He or she worked hard to prepare youngsters for tests, subsequent instruction, and the value-orientations of adult life. Though relatively free to depart from district syllabus or community expectation, the teacher seldom exercised either freedom.

Each of the above statements is only partly correct. This summary is a drastic oversimplification of the circumstances observed by the field people and portrayed in the case study reports. The picture at each of the sites--seen through the experienced but singular eyes of our observer--is a special picture, greatly influenced by the administrators, the parents, and the students encountered; colored with technical, professional, economic and social problems. Somehow the pictures do not aggregate across sites to be either the picture of national education represented by the popular press (though no less aggrieved) or that presented in the professional education publication (though no less complicated). It is an interesting collection.

Robert E. Stake
Jack A. Easley, Jr.
Codirectors

LIST OF CASE STUDY SITES

	Code Name	Description	Field Observer
1	RIVER ACRES	a suburb of Houston	Terry Denny
2	FALL RIVER	a small city in Colorado	Mary Lee Smith
3	ALTE	a suburb of a large Midwestern city	Louis M. Smith
4	BRT	a consolidated district in rural Illinois	Alan Peshkin
5	URBANVILLE	a metropolitan community of the Pacific Northwest	Wayne W. Welch
6	PINE CITY	a rural community in Alabama	Rob Walker
7	WESTERN CITY	a small city in middle California	Rodolfo G. Serrano
8	COLUMBUS	the Columbus, Ohio, school district	James R. Sanders & Daniel L. Stufflebeam
9	ARCHIPOLIS	an Eastern middle seaboard city	Jacquetta Hill-Burnett
10	VORTEX	a small city in Pennsylvania	Gordon Hoke
11	GREATER BOSTON	an urban section in metropolitan Boston	Rob Walker

CASE STUDIES IN SCIENCE EDUCATION--ROSTER

Co-directors: Robert Stake, Jack Easley

Other Staff

Kip Anastasiou, Connie Bowen, Beth Dawson, Jo Ann Day, Terry Denny
Tom Hastings, Gordon Hoke, Jennifer McCreadie, Charles Secolsky
Doug Sjogren, Peg Steffenson, Tom Watkins, Charles Weller

Field Observers

Terry Denny, specialist in evaluation of teaching materials, University of Illinois
Jacquetta Hill-Burnett, anthropologist, University of Illinois
Gordon Hoke, specialist in innovation and school-community relations, University of Illinois
Alan Peshkin, comparative education specialist, University of Illinois
James Sanders, education evaluation, Western Michigan University
Rudy Serrano, anthropologist, California State College, Bakersfield
Louis Smith, ethnographer, specialist in case study, Washington University of St. Louis
Mary Lee Smith, educational evaluator, University of Colorado
Daniel Stufflebeam, education evaluation, Western Michigan University
Rob Walker, sociologist, field-study specialist, University of East Anglia
Wayne Welch, science education, University of Minnesota, Minneapolis

Other Site Visitors

Arnold Arons, Mike Atkin, Fred Bohn, Harry Broudy, Moses Clark
William Dunkum, Gary Eichelsdorfer, Donald Grogan, Arlen Gullickson
Archibald Haller, Robert Henderson, Kathleen Hotvedt, Jennifer James
Bernard Johns, Kenneth Landin, Howard Levine, Susan Meyers
Edwina Milam, Nell Murphy, Jack Neal, Richard Painter, Fred Rodgers
Andrea Rothbart, Ronald Stewart, James Wailes, James Young

Other Assistants

Jolene Andres, Linda Bohlayer, Melanie Brian, Norman Bowman
Elois Butts, Stan Conrad, Judy Dawson, Elizabeth Easley, Dennis Fisher
Colin Gould, Betsy Hutchins, Kathy Jaycox, Emily Rice, Carol Sage
Valerie Soderstrom, Bernadine Evans Stake, Pat Templin, Charlotte Watkins

Consultants

David Bohm, physicist, University of London
Peter Fensham, science educator, Monash University
Lawrence Fuchs, American studies, Brandeis University
David Hamilton, education research, Glasgow
Tom Hastings, measurements specialist, University of Illinois
Donald Schön, urban planning, Massachusetts Institute of Technology
Helen Simons, evaluation specialist, University of London
Louis Smith, ethnographer, specialist in case study, Washington University of St. Louis
Lawrence Stenhouse, educational research, University of East Anglia
Frances Stevens, curriculum specialist, Leeds University (retired)
Clayton Thomas, educational administration, Illinois State University
Iris Weiss, survey specialist, Research Triangle Institute
Hassler Whitney, mathematician, Institute for Advanced Study, Princeton

Advisory Group

Mike Atkin, Alice Baum, Robert Davis, Ernest House
Margie Lerch, J. C. Martin, Jim Raths, Fred Rodgers
Rita Simon, Blanchard Sprunger, Ruth Vernon, Klaus Witz

NSF Project Officers: Arlen Gullickson, Linda Ingison

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Chapter 18

SURVEY FINDINGS AND CORROBORATIONS

Elizabeth Knight Dawson

PURPOSE OF THE SURVEY

Case Studies in Science Education was one of three projects funded by the National Science Foundation to assess the status of science education* in American schools.

> *The purpose of most investigations...is the collection of information which will provide a basis for action, whether immediately or in the long run. The investigator perceives a problem which, in his view, requires solution, decides that a particular study will contribute to this end, and embarks upon the study. If he is blessed with a creative turn of mind and a modicum of luck, and if he plans his study soundly, the findings may well be of wide scientific interest. If he is less inspired, but selects a problem of practical importance, and if he plans his study soundly, the findings will be useful ones, though of less wide interest.***

Few would disagree that the subject of science education as it currently exists meets two of the criteria for a study that leads to findings that are both useful and of wide interest. Science education has its share of problems, some that relate to education in general and some that are specific to science itself, and these problems most certainly are of practical importance.

The survey activities resulted from the combined efforts of many of the project staff. Beth Dawson coordinated the survey and authored the findings reported in this chapter. The Director of the project, Robert E. Stake, was responsible for developing the majority of the questionnaire and originated the scenario format. Almost all project staff were involved in field testing and revising the scenarios. The direction of the survey administration and analysis were greatly assisted by Jennifer McCreadie who supervised the mailing, follow-up and coding of the questionnaires as well as analyzing and summarizing the free response items. Charles Secolsky was most helpful in assisting with the computer programming and analysis of survey data.

*Throughout this report, science education is used to include education in the natural sciences, mathematics and social studies.

**J. H. Abramson, Survey Methods in Community Medicine, (London: Churchill Livingston, 1974) p. 1.

The major activity of the Case Studies in Science Education project was to identify and study educational issues of national concern. Ten districts in the United States were selected, and later supplemented with an eleventh district, for a four to eight week on-site observation study. During one or more periods of on-site observation a site visit team consisting of project personnel and experts in science education visited the district. The issues and insights resulting from the observations and the case study visits have been detailed in the remainder of this report. The present chapter describes and presents findings from the third phase of study, a national survey of educators, administrators and consumers of science education.

The overall objective of the survey was to inquire into complex and subtle issues commonly involved in teaching and learning in problem-ridden times. Many of these issues did not originate in science, per se, but have appeared at the eleven observation sites and are influencing the quality of course offerings and teacher services. It is our hope that the case study and site visit reports and the results from the national survey provide the National Science Foundation with greater insights into the complex conditions and issues in science education for grades kindergarten through twelve in the United States today.

The specific purposes of the survey were three fold: to give confirmation or disconfirmation to the extended observations earlier made by the field observers in the eleven selected districts; to identify the diversity and nuances of views held by people in and around the classrooms in this country; and to obtain suggestions as to what steps might be taken by agencies such as the National Science Foundation to remedy the more tractable difficulties.

One of the major advantages of survey research is that a great deal of information can be obtained from a large population without the expense of either a complete census or direct observation of the variables under investigation. Additionally, if samples are properly selected, the information is reasonably accurate--within sampling error, of course. However, survey research also has distinct disadvantages that must be recognized. Probably the most important is that information obtained by this method is superficial in nature and does not penetrate into the issues being studied. And there are other problems: bias on the part of respondents may make the results invalid; questionnaire items may be incorrectly interpreted; sampling errors may be greater than estimated.*

The methodology of the entire study is detailed in Chapter C; the specific method used in the survey is described on the following pages. If care is taken in the interpretation of the survey results and if they are contrasted and integrated with the conclusions from the case study observations, we expect that the findings of the Case Studies in Science Education project will be useful and of wide interest--both to the National Science Foundation and others concerned with science education.

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*Fred N. Kerlinger, Foundations of Behavioral Research, 2nd ed. (New York: Holt, Rinehart & Winston, 1973), pp. 410-423.

METHOD OF SURVEY

Instrument Development. Issues relevant to science education were identified at the eleven sites by experienced ethnographers and drafted into scenario form by project personnel. The scenario form was developed as an attempt to communicate the complexity of an issue to respondents by incorporating the issues in a hypothetical setting or situation. The situation is really a contrived illustration and provides a background against which questions relevant to the issue may be projected. Thus, a given scenario consists of two major sections: a situation designed to provide stimulation to discussion and a series of questions raised by or related to the situation. While the scenario content was chosen on the basis of the case study experiences and attempted to reflect a wide range of educational issues, it should be noted that time constraints required the major instrument development activities to be completed before all of the field observations were finished.

The survey instrument itself consists of four pages and has three major sections. A sample questionnaire, designed specifically for one of the twenty-two respondent groups is included as an appendix to this chapter. The first page contains demographic, biographic and experience-related questions designed specifically for the respondent group to which it was administered. This page also contains one or more general issue-oriented questions that may be common to more than one respondent. The analyses of questions from this page of the questionnaire are presented in the section entitled: Responses to Demographic and Experience-Related Questions of the present chapter.

The second portion of the questionnaire is on pages 2 and 3 and consists of a scenario and related questions. Eight scenarios were developed; each was administered to two, three or four respondent groups. The content of the eight scenarios is briefly described below along with the respondent groups to which each was administered. The analyses of the scenarios are presented in the section entitled: Responses to Scenario.

The final section of the questionnaire is on page 4 and consists of general items regarding science education. Three distinct fourth pages were designed and each design was printed on one-third of the questionnaires for each respondent group. Results are presented in the section entitled: Responses to Science Education General Questions.

There was no attempt to include all possible response categories for each item on the questionnaires. Frequently, interest centered on the number of people who would select categories that were of particular interest in this study. The "other" option was thus included on many items so that respondents would have a place to register their feelings if they were different from the categories provided.

The division of the questionnaire as described above was done in order to accomplish several goals. First, it was desirable to collect demographic and experiential data that vary from respondent group to respondent group; thus the different forms of the first pages. The scenarios were assigned to specific respondent groups on the basis of relevance and in order to obtain a diversity of opinion on various issues. Each scenario was assigned to only a small number of groups in order to maintain a reasonable length of the instrument. Finally, it was desirable to have a number of items that would be administered to larger samples and would include respondents from all groups. Three distinct fourth pages were therefore designed to provide responses to a larger number of general questions on science education.

Two pilot administrations were performed on the questionnaires with subsequent revision of instruments following each. A total of 133 persons in various subgroups were included in the pilot administration. Seventy-five percent of the respondents reported that they completed the questionnaire in 25 minutes or less.

Sampling and Administration. The general groups surveyed include district superintendents, principals, curriculum supervisors, teachers, high school counselors, senior level students and their parents. The sampling of all but the last three groups was performed by Research Triangle Institute, creating subsamples of those drawn by RTI for the National Science Foundation survey of materials usage in pre-college education. The use of the RTI sample permits generalization to the national population. A multi-stage stratified cluster design was used with the primary sampling units defined as 100 geographic areas. Within each primary sampling unit, four school districts from both the public and private domains were selected with probability proportional to the total district enrollment. This sampling procedure required weighted observations to estimate population values. Further details of the RTI procedures are outlined in their proposal No. 22-77-09-01.*

The generation of the Case Studies in Science Education (CSSE) subsamples is presented in schematic form in Figure 18-1 and briefly described as follows. From the RTI sample school districts, approximately 500 in number, a sample of 149 superintendents was generated. Three principal samples were selected: those of schools containing any of the grades kindergarten through 6; those of schools containing any of the grades 7 through 9; and those of schools containing any of the grades 10 through 12. Principals of schools containing grades in more than one of the above divisions (e.g. a school with grades 9 through 12) were randomly assigned to only one category. This procedure resulted in principal sample sizes of 94, 86 and 87 respectively.

The RTI supervisor sample consisted of those persons who had curriculum coordinating responsibilities in the 500 school districts, and included a number of individuals who were also teachers, principals and department heads. Each of the approximately 1000 supervisors in the RTI sample was assigned to one of the following groups according to the subject and grade range of responsibility: science supervisors (grades K-6), mathematics supervisors (grades K-6), science supervisors (grades 7-12), mathematics supervisors (grades 10-12), and social studies supervisors (grades 7-12). Persons responsible for K-6 social studies only were omitted from the sampling process. This procedure resulted in superviser sample sizes of 210, 198, 200, 211 and 201 respectively.

Seven teacher samples were generated on the basis of subject and grade range. These were elementary teachers (n=150); from grades 7 through 9, science teachers (n=150), mathematics teachers (n=150) and social studies teachers (n=75); from grades 10 through 12, science teachers (n=150), mathematics teachers (n=150) and social studies teachers (n=75).

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*Research Triangle Institute, A Proposal for Survey of Materials Usage in Pre-College Education in the U.S.: RFP 76-108 (Research Triangle Park, North Carolina, 1976).

The procedure for obtaining counselor, student and parent samples was carried out by CSSE project personnel. From Research Triangle Institute's sample of high school principals (n=87), thirty-five schools were selected at random. The principals of these schools were telephoned to obtain the names of the counselors and to request their participation in the survey. One counselor was called from each school and asked to assist with the administration of questionnaires to one class of senior students and their parents for a small fee. Twenty-seven schools participated in this process. The counselor was instructed to select a representative class of seniors. Although the counselor was cautioned not to select a class of students that was in any way unique (i.e., science or math classes or classes that meet at a time when a large number of students are not in school), the actual class selection was delegated to the counselor. The student questionnaires were administered and collected during a class period. No attempt was made to obtain responses from students not present on that day.

Each student in the class selected by the counselor addressed a questionnaire packet to his or her parents. The questionnaire packets were then mailed to parents by the counselor. It was asked that only one parent complete the questionnaire. Each parent returned the survey directly to the University of Illinois and concurrently mailed a postcard to the counselor, thus providing the counselor with a mechanism to follow-up non-responding parents.

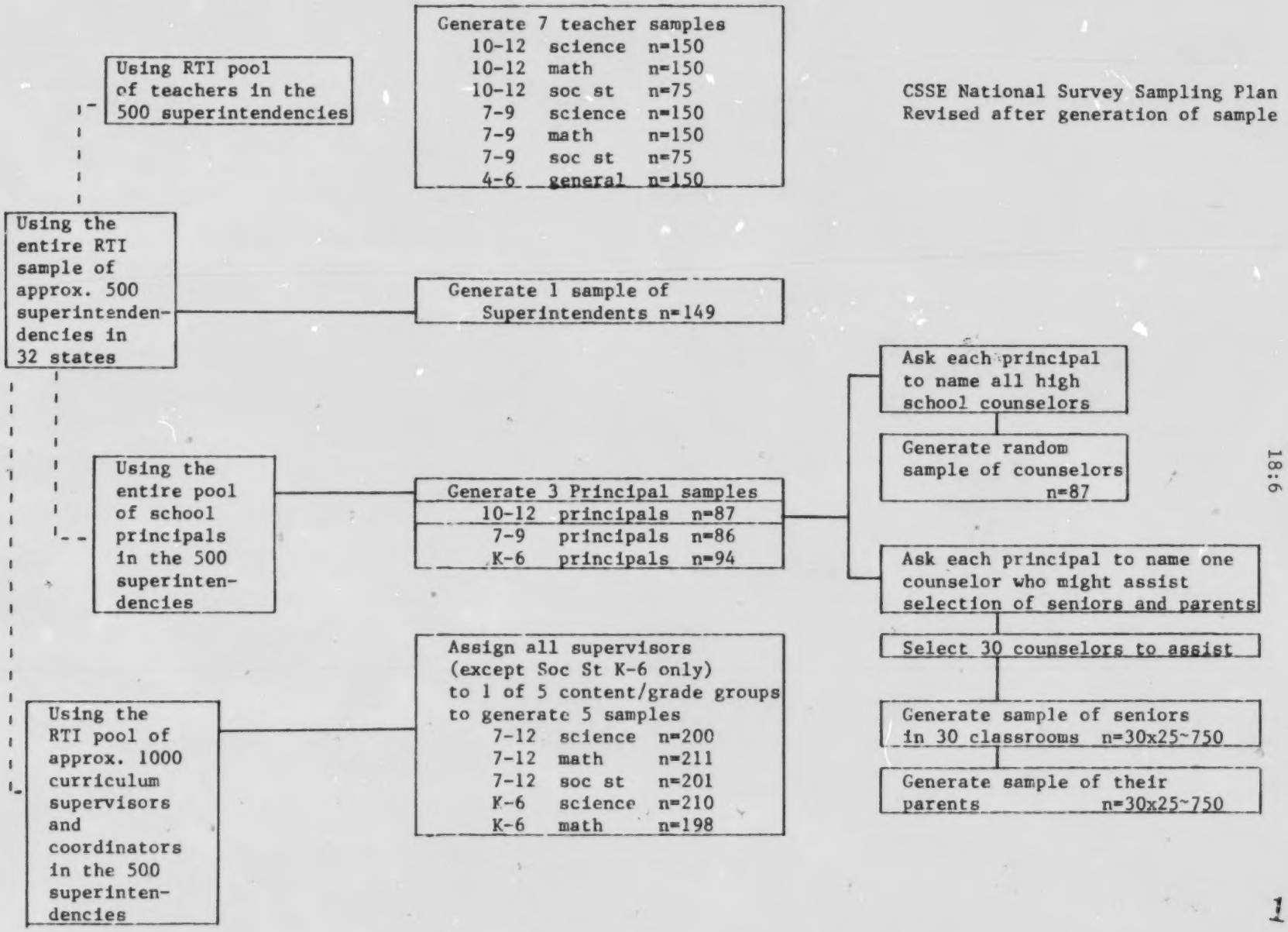
In addition to the 35 principals contacted by telephone, all other high school principals were asked by mail to send a list of the counselors at their school. From these and follow-up telephone responses, one counselor was selected at random from each school. For those remaining schools from which no counselor names were obtained, a questionnaire was mailed simply addressed to the "head counselor."

The initial mailing was carried out during the week of September 26, 1977, to superintendents, supervisors and principals. Teacher questionnaires were mailed the week of October 3 by Research Triangle Institute to preserve promised anonymity of this sample. Reminder postcards were sent to all samples the week of October 10, and a second copy of the questionnaire was mailed to all non-respondents during the week of October 17.

Packets of questionnaires for students and teachers were sent to counselors the weeks of September 26 through October 10. Counselor questionnaires were mailed during the last two weeks of October. Due to constraints of time, no follow-up effort was made on the counselor sample.

Each respondent, except students, received a questionnaire packet consisting of survey instrument, a one page summary of the purpose of the study and the survey, and a stamped, addressed, return envelope. Students questionnaires were handed out in class and returned to the counselor.

FIGURE 18-1: SCHEMATA OF SURVEY PLAN


Generate 7 teacher samples
10-12 science n=150
10-12 math n=150
10-12 soc st n=75
7-9 science n=150
7-9 math n=150
7-9 soc st n=75
4-6 general n=150
Using RTI pool of teachers in the 500 superintendencies
CSSE National Survey Sampling Plan
Revised after generation of sample
Using the entire RTI sample of approx. 500 superintendencies in 32 states
Generate 1 sample of Superintendents n=149
Ask each principal to name all high school counselors
Generate random sample of counselors n=87
Using the entire pool of school principals in the 500 superintendencies
Generate 3 Principal samples
10-12 principals n=87
7-9 principals n=86
K-6 principals n=94
Ask each principal to name one counselor who might assist selection of seniors and parents
Select 30 counselors to assist
Assign all supervisors (except Soc St K-6 only) to 1 of 5 content/grade groups to generate 5 samples
7-12 science n=200
7-12 math n=211
7-12 soc st n=201
K-6 science n=210
K-6 math n=198
Generate sample of seniors in 30 classrooms n=30x25~750
Generate sample of their parents n=30x25~750
Using the RTI pool of approx. 1000 curriculum supervisors and coordinators in the 500 superintendencies

18:6

Response Rates. The table below describes the eight scenarios and the samples to which each was administered. In addition, the sample sizes and response rates are indicated for each group.

DESCRIPTION OF SCENARIOS & SURVEY RESPONSE RATES

Scenario Content	Respondent Groups	Sample Size Mailing	Sample Size Response	Response Rates in Percent
S: Budget cuts and their ramifications	Superintendents	149	74	50
	Sci Supervisors (7-12)	200	139	70
	Parents	~250	111	~44
T: Issues of pluralism and uniformity	Sci Supervisors (K-6)	210	134	64
	Principals (10-12)	87	54	62
	Parents	~250	142	~57
U: The back-to-the-basics movement	Soc Studies Sup (7-12)	201	153	76
	Principals (K-6)	94	59	63
	Math Teachers (10-12)	150	94	63
V: Problems that arise in diagnostic teaching	Math Supervisors (K-6)	198	116	59
	Math Teachers (7-9)	150	81	54
W: Teaching and socialization	Principals (7-9)	86	47	52
	Teachers (K-6)	150	78	55
X: Support systems available to teachers	Math Supervisors (7-12)	211	132	63
	Science Teachers (7-9)	150	93	62
Y: Personal bias in teaching	Soc Studies Teachers (7-9)	75	42	56
	Soc Studies Teachers (10-12)	75	41	55
	Senior students	361	361	100
	Parents	~250	148	~59
Z: Elitism in the sciences	Counselors (10-12)	87	46	53
	Science Teachers (10-12)	150	101	67
	Senior students	375	375	100

Twenty-two distinct questionnaires were prepared for the groups listed above. In addition, three different fourth pages of questions were printed on the instruments for each group, resulting in 66 distinct instruments.

It was hoped that response rates would approach 70 percent in order to provide samples of approximately 100 respondents for superintendents, supervisors and all teachers except social studies. For social studies teachers, principals and counselors, a return of approximately 50 was anticipated. Response rates ranged from 50 percent for superintendents to 76 percent for social studies supervisors of grades 7 through 12, although one sample of parents is estimated to have a 44 percent rate. Parent response rates were computed on the basis of

the number of student responses. Response rates of 100 percent are presented for students due to the nature of the questionnaire administration to this group. Ignoring parent and student returns, the median response rate was 62 percent.

Data Analysis. Data from questionnaires were transferred to optical scannine sheets. All questionnaire items having response options were given numerical codes to facilitate computer analysis. Most of the open-ended questions were analyzed by hand and, as a result, are reported only with raw frequencies of responses. The optical scanning sheets were read onto punched cards that were used to create data files on computer disk. Data were analyzed using the standard programs in the Statistical Package for the Social Sciences.* Each analysis was performed twice, first to calculate unweighted frequencies and percentages and again to calculate weighted percentages. The procedure for calculating the latter is discussed below.

Interpretation of Results. The question of whether to use weighted or unweighted percentages is in the interpretation of findings from a survey such as the present one is problematic. The decision of which procedure to use is perhaps best based upon the purpose of the interpretation. If stratified or cluster sampling has been used and differing sizes of cluster have been selected with probabilities proportionate to size, and if it is desirable to generalize to the original population, the use of weighted percentages is appropriate.** However, unweighted percentages may be justified if it is desirable to interpret the results simply as a proportion of persons responding to a given question.

The use of the Research Triangle Institute data base, after appropriate modification of their original sampling weights to incorporate the subsampling procedure, permits generalization of responses from the present survey to the national population for superintendents, principals, teachers and supervisors. This procedure assumes, however, that the opinion of each individual in the population carries equal weight. If it were thought that the opinion of one type of individual is more important than that of another type, for example, a superintendent of a large metropolitan district as compared to a superintendent of a small rural district, then the weighting scheme used in the present report is undesirable.

An additional problem arose in the calculation of weighted estimates for counselors, students and parents. In order for the weighted reponses to be consistent with those of the samples selected by Research Triangle Institute, an additional sampling weight should be required. In the case of students, for example, in addition to the weight of the high school selected, it would be necessary to estimate the number of senior students similar to those responding that each student represents. In the present study, counselors were asked to use their own judgment, following certain guidelines, in the selection of a class of students. Such an estimate would be subject to extreme errors, both of sampling and bias. The same would be true for parents, and perhaps to a lesser extent, for counselors. Thus it was decided to use as weights for these three groups only the school weight as provided by RTI as appropriately modified for subsampling.

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*Norman H. Nie, et al, Statistical Packages for the Social Sciences, 2d ed. (New York: McGraw-Hill, 1975).

**Seymour Sudman, Applied Sampling (New York: Academic Press, 1976).

The present report should present both weighted and unweighted percentages for all groups in order to be complete. Space constraints of including each question and answers of all respondent groups in the body of the text preclude this approach. Thus, results for superintendents, principals, teachers and supervisors are presented with both the raw frequency tabulations and only the modified weighted percentages. For these 16 groups, the weighted percentages may be used, with usual caveats, to generalize to the national population. For the remaining response groups, counselors, parents and students, raw frequency tabulations are accompanied by both weighted and unweighted percentages. The unweighted figures are in parentheses directly following the weighted ones. The discussion of findings has concentrated on the weighted percentages in all cases, but the reader of this report is cautioned to examine both percentages and to form generalizations accordingly.

In order to facilitate the calculations of standard errors for various proportions and sample sizes, Research Triangle Institute provided a formula for calculation of standard errors based upon some assumptions regarding the design effect (DEFF) of the samples. The formula is as follows.

$$SE = \sqrt{\frac{DEFF\ p(1-p)}{n}}$$

Where p is the proportion responding to a given answer, n is the sample size, and the design effect is estimated as 2.472 for all samples except students and parents samples for which a design effect value of 10 was recommended by Research Triangle Institute.

Tables 18-1 and 18-2 contain standard errors for various proportions and sample sizes. Table 18-1 should be used to estimate standard errors for superintendents, principals, teachers, supervisors and counselors. The standard errors in Table 18-2 are for use with students and parents. For sample sizes and p-values not represented in the table it is suggested that the next smaller sample size and the next large p-value be used. This will provide a more conservative estimate. Alternately, the above formula may be used to calculate an estimated standard error.

Throughout the discussion of the results, few statements are made regarding a significant statistical difference in the responses. The standard errors may be used to test for significant differences if this degree of specificity is desired. The traditional formula for this procedure is discussed by Snedecor and Cochran.*

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*George W. Snedecor and William G. Cochran, Statistical Methods, 6th ed. (Ames, Iowa: Iowa State University Press, 1967), pp. 219-221.

TABLE 18-1

Approximate Standard Errors in Percents(1)

Sample Size	P-values - %									
n	5 or 95	10 or 90	15 or 85	20 or 80	25 of 75	30 or 70	35 or 65	40 or 60	45 or 55	50
30	6.3	8.6	10.3	11.5	12.4	13.2	13.7	14.1	14.3	14.4
40	5.4	7.5	8.9	9.9	10.8	11.4	11.9	12.2	12.4	12.4
50	4.8	6.7	7.9	8.9	9.6	10.2	10.6	10.9	11.1	11.1
60	4.4	6.1	7.2	8.2	8.8	9.3	9.7	9.9	10.1	10.1
70	4.1	5.6	6.7	7.5	8.1	8.6	9.0	9.2	9.3	9.4
80	3.8	5.3	6.3	7.0	7.6	8.1	8.4	8.6	8.7	8.8
90	3.6	5.0	5.9	6.6	7.2	7.6	7.9	8.1	8.2	8.3
100	3.4	4.7	5.6	6.3	6.8	7.2	7.5	7.7	7.8	7.9
110	3.3	4.5	5.4	6.0	6.5	6.9	7.2	7.3	7.5	7.5
120	3.1	4.3	5.1	5.7	6.2	6.6	6.8	7.0	7.1	7.2
130	3.0	4.1	4.9	5.5	6.0	6.3	6.6	6.8	6.9	6.9
140	2.9	4.0	4.7	5.3	5.8	6.1	6.3	6.5	6.6	6.6
150	2.8	3.9	4.6	5.1	5.6	5.9	6.1	6.3	6.4	6.4
200	2.4	3.3	4.0	4.5	4.8	5.1	5.3	5.5	5.5	5.6
150	2.2	3.0	3.6	4.0	4.3	4.6	4.7	4.9	5.0	5.0
300	2.0	2.7	3.2	3.6	3.9	4.2	4.3	4.5	4.5	4.5
350	1.8	2.5	3.0	3.4	3.6	3.9	4.0	4.1	4.2	4.2
400	1.7	2.4	2.8	3.1	3.4	3.6	3.8	3.9	3.9	3.9
450	1.6	2.2	2.7	3.0	3.2	3.4	3.5	3.6	3.7	3.7
500	1.5	2.1	2.5	2.8	3.0	3.2	3.4	3.4	3.5	3.5

$SE = \sqrt{\frac{DEFF\ p(1-p)}{n}}$ assuming DEFF = 2.472

(1)To be used with Superintendents, Supervisors, Principals, Counselors and Teachers

TABLE 18-2

Approximate Standard Errors in Percents[1]

Sample Size	P-values - %									
n	5 or 95	10 or 90	15 or 85	20 or 80	25 or 75	30 or 70	35 or 65	40 or 60	45 or 55	50
100	6.9	9.5	11.3	12.7	13.7	14.5	15.1	15.5	15.7	15.8
110	6.6	9.1	10.8	12.1	13.1	13.8	14.4	14.8	15.0	15.1
120	6.3	8.7	10.3	11.6	12.5	13.2	13.8	14.1	14.4	14.4
130	6.0	8.3	9.9	11.1	12.0	12.7	13.2	13.6	13.8	13.9
140	5.8	8.0	9.5	10.7	11.6	12.3	12.8	13.1	13.3	13.4
150	5.6	7.8	9.2	10.3	11.2	11.8	12.3	12.7	12.9	12.9
350	3.7	5.1	6.0	6.8	7.3	7.8	8.1	8.3	8.4	8.5
360	3.6	5.0	6.0	6.7	7.2	7.6	8.0	8.2	8.3	8.3
370	3.6	4.9	5.9	6.6	7.1	7.5	7.8	8.1	8.2	8.2
380	3.5	4.9	5.8	6.5	7.0	7.4	7.7	8.0	8.1	8.1
390	3.5	4.8	5.7	6.4	6.9	7.3	7.6	7.8	8.0	8.0
400	3.5	4.7	5.7	6.3	6.9	7.3	7.5	7.8	7.9	7.9
700	2.6	3.6	4.3	4.8	5.2	5.5	5.7	5.9	6.0	6.0
710	2.6	3.6	4.2	4.8	5.1	5.4	5.7	5.8	5.9	5.9
720	2.6	3.5	4.2	4.7	5.1	5.4	5.6	5.8	5.9	5.9
730	2.6	3.5	4.2	4.7	5.1	5.4	5.6	5.7	5.8	5.9
740	2.5	3.5	4.2	4.7	5.0	5.3	5.5	5.7	5.8	5.8

$$SE = \sqrt{\frac{DEFF\ p(1-p)}{n}}$$ assuming DEFF = 10.0

[1] To be used with parents and students

18:11

Comments. An undertaking of the magnitude of the survey summarized in the present chapter almost inevitably entails difficulties in design, administration and/or reporting. The Case Studies in Science Education Survey had its share of problems and the major difficulties, while many are also discussed elsewhere in the report, are summarized below.

As described previously, each of the scenarios on pages 2 and 3 of the questionnaire was designed to acquaint the respondents with an important issue in science education and then to pose a number of questions about that issue. While the entire questionnaire was motivated by the experiences of the case study field observers, it was hoped that the scenarios especially would capture the essence of those experiences. A major difficulty occurred, however, with the attempt to represent complex local conditions, using a contrived setting, in survey language. It was planned that the scenario format would orient the respondents to the general issue with enough specific information to increase the relevance of the questions to their own situations and to provide project personnel with a framework within which to interpret their responses. It was found, however, that respondents often reacted to the details portrayed in the scenarios instead of the underlying issues.

The description of the questionnaire provided above indicates the complexity of the survey design. The twenty-two samples, each with three distinct Page 4 formats, resulted in sixty-six different instruments. The printing layout, record keeping and analysis became very complex. Yet there were many groups whose opinions were important to assess and there were many questions to ask with only a limited amount of space on any one questionnaire. The result of this design was that a great deal of information was obtained, much of it based upon small sample sizes. The larger standard errors accompanying small samples present a problem to readers who wish to generalize beyond the present sample with any considerable precision.

Despite follow-up post cards and a second mailing of the questionnaire to non-respondents, the overall proportion of persons returning the questionnaire was only slightly greater than 60 percent; it had been hoped that a response rate approaching 70 percent would be achieved. An obvious component of the problem, but an unavoidable one, was that the mailing addresses of respondents in the samples selected by Research Triangle Institute were from the school year preceding the one in which the present survey was completed. It would be advisable to investigate non-respondent bias by following-up a sample of these persons and comparing them to the respondents on several basic criteria. This type of follow-up was not done in the present project, partially due to constraints of time in completing the survey for the final report.

Another consequence of time constraints was the concentration on simple tabular analyses of responses from each sample in the final report. The findings summarized herein really result only from first order analyses; many other divisions of the data are possible and might well provide additional insights into the different ways people feel about issues in science education. In addition to the obvious breakdowns by geographic location and size of school district, it might be instructive to compare opinions of less experienced with more experienced personnel, of those who have and have not participated in NSF Institutes, of administrative and teaching personnel, or of those who disagree on the basic goals of education. Additionally,

the possibility exists for exploration of group similarities or common dimensions of opinion using multivariate methods. The survey has resulted in a wealth of information; it would be regretable not to examine the data in greater detail than is done in the present chapter.

Despite the difficulties cited, the survey was not unsuccessful in its attempt to corroborate case study findings. Some of the major case study results are referred to in the context of the survey discussion; assimilation and overview chapters of this report further highlight the integration of these two phases of the study. The survey was only one portion of the project with a budget of less than ten percent of the cost of the entire study. It was meant to supplement and extend - not to provide a summary of the findings of the entire project. It was designed to assess the generalizability of the major case study results -- and, in general, accomplished these objectives. As the survey responses are examined, the reader is repeatedly reminded of a case study finding. The results especially indicate an overall confirmation of the importance of the science education issues identified in the eleven case study sites - and should provide those interested in science education with new insights into these issues.

RESPONSES TO DEMOGRAPHIC AND EXPERIENCE-RELATED QUESTIONS

The first page of each questionnaire was primarily devoted to demographic, biographic and experience-related questions. Each group received a personalized questionnaire front page that asked questions about their experience and educational activities. One or two questions of a more general nature regarding science education were also included in the space following the demographic and biographic questions. The results of the responses to the general questions are summarized immediately following analysis of the demographic and experience-related questions. In the following analyses, as throughout the present chapter, raw frequencies and weighted percents are given for all groups except students, parents and counselors in which cases unweighted percents are also reported in parentheses following the weighted percents. The percentages are based upon those who answered the question, not upon the entire sample. Approximate standard errors may be found in Tables 18-1 and 18-2.

All respondents were asked to describe their school districts in terms of size and geographic relationship to larger cities. They were also requested to indicate the manner in which grades are commonly divided into schools in their district. Unfortunately, a large number (23%) of respondents neglected to record answers to them. In addition, the coding of the second question did not permit easy computer calculation. Consequently, the results presented here pertain only to the geographic description of the district and the reader is cautioned to keep in mind the high proportion of missing data.

Approximately half of our respondents, according to raw frequencies, reported that their districts are located in rural or small cities/towns (see results on following two pages). The weighted percentages indicate that approximately 60 to 70 percent are from this type of school district. The sampling weights provided by Research Triangle Institute were based on a multi-stage cluster design that included stratification on geographic area and subsequent sampling of school districts with probability proportional to total district enrollment. These weights were calculated by Research Triangle Institute on the basis of actual probabilities with which each respondent (except students, parents and counselors) entered the sample.* As a consequence of the sampling procedure, respondents from smaller areas may represent more subjects similar to themselves than do respondents from larger areas. Using raw frequencies, approximately 10 percent of our sample indicated they are from cities over 500,000 or suburbs of such cities. The weighted percentages are approximately the same as the raw frequencies for this combined geographic division.

Questions for Superintendents. Superintendents were asked to note the number of years they have been superintendents. Fifteen percent reported that this is their first year in a superintendency and 35 percent stated they have been in this position more than 11 years. The weighted average is 9.5 years. Sixty-eight (96%) reported they taught a weighted average of 5.8 years before becoming

*Research Triangle Institute, A Proposal for Survey of Materials Usage in Pre-College Education in the U.S.: RFP 76-108 (Research Triangle, North Carolina, 1976).

TABLE 18-3

Which of the following best describes the location of your district?

	Superintendents		Supervisors: K-6 Science		K-6 Math		7-12 Science		7-12 Math		7-12 Soc Stud		Principals: K-6		7-9		10-12		Counselors		
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
Rural or farming community	12	74	30	59	25	67	19	53	18	44	24	66	12	29	10	49	10	41	10	27	(28)
Small city or town (up to 50,000)	9	17	24	28	19	18	23	31	23	26	16	15	12	25	11	31	8	31	7	41	(19)
Medium-sized city (50,000-100,000)	2	2	5	2	5	3	12	4	7	2	12	2	4	4	1	0	2	3	1	1	(3)
Suburb of a medium-sized city	2	4	4	5	4	1	0	0	6	22	4	1	3	5	2	6	3	2	4	4	(11)
Large city (100,000 to 500,000)	4	1	7	1	9	6	14	2	16	2	13	1	1	1	2	2	4	3	4	2	(11)
Suburb of large city	3	1	6	1	8	3	11	4	4	1	13	3	7	17	7	9	5	3	5	5	(14)
Very large city (over 500,000)	1	0	8	1	8	1	8	0	9	1	4	0	2	4	2	2	2	13	2	16	(6)
Suburb of a very large city	5	1	9	3	2	1	12	3	7	3	12	8	2	9	0	0	3	1	2	3	(6)
Other/more than 1	1	0	3	2	8	0	7	4	2	0	8	4	3	7	1	1	4	3	1	1	(3)
Omissions	35	-	38	-	28	-	33	-	40	-	47	-	13	-	11	-	13	-	10	-	-
Total Sampling Size	74		134		116		139		132		153		59		47		54		46		

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TABLE 18-3, Continued

	Teachers														Seniors		Parents	
	Elem K-6		Science 7-9		Math 7-9		Soc Stud 7-9		Science 10-12		Math 10-12		Soc Stud 10-12					
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Rural or farming community	13	27	16	36	16	26	12	34	14	17	12	12	10	41	132	26 (21)	80	29 (26)
Small city or town (up to 50,000)	23	34	14	21	12	37	8	31	21	28	24	45	5	15	178	45 (28)	68	27 (22)
Medium-sized city (50,000-100,000)	2	2	6	7	10	7	1	5	8	5	7	5	4	8	43	6 (7)	31	18 (10)
Suburb of a medium-sized city	1	1	2	2	1	1	1	1	1	13	2	1	3	7	73	7 (12)	22	4 (8)
Large city (100,000 to 500,000)	4	11	6	6	8	10	4	9	7	4	4	2	1	4	68	6 (11)	28	3 (9)
Suburb of a large city	8	11	7	7	6	3	7	15	9	18	7	20	3	8	71	4 (11)	25	3 (8)
Very large city (over 500,000)	3	6	3	1	2	1	0	0	3	4	8	9	0	0	23	2 (4)	7	1 (2)
Suburb of a very large city	4	5	11	19	1	5	0	0	7	11	6	5	2	15	43	4 (7)	41	15 (13)
More than one/ other	2	3	1	1	1	1	2	4	1	0	3	2	1	2	2	0 (0)	3	0 (1)
Omissions	18	-	27	-	24	-	7	-	30	-	21	-	12	-	103	- -	96	- -
Total Sampling Size	78		93		81		42		101		94		41		736		401	

18:14

superintendents. Superintendents were asked to estimate the current student enrollment in their districts, the number of fulltime teachers and the per-pupil expenditure in 1976-77 (including all annual operating expenses but not capital outlay). The enrollment figures reported indicate that our superintendents came from districts widely varying in size. Accordingly, the number of full-time teachers is also spread over a large range. Raw frequency modal intervals are a district with 5,000 to 10,000 students and 200 to 400 teachers; weighted averages are 4623 and 273 respectively. Seventy-five percent of the superintendents indicated that per-pupil expenditures range between 1000 and 1500 dollars yearly. The weighted average is $1250 per pupil

What is the current approximate student enrollment in your district?

Superintendents

Enrollment	n	%
500 or less	8	20
501 to 1,000	7	24
1,001 to 2,500	5	14
2,501 to 5,000	8	18
5,001 to 10,000	18	14
10,001 to 20,000	9	6
20,001 to 50,000	10	3
More than 50,000	8	1

The weighted average enrollment in the 73 districts reporting is 4,624 students.

How many fulltime equivalent teachers are there in your district?

Superintendents

Number of Teachers	n	%
20 or less	6	10
21 to 100	9	33
101 to 200	6	10
201 to 400	14	22
401 to 600	9	18
601 to 1,000	7	3
1,001 to 2,000	7	3
More than 2,000	9	1

The weighted average number of teachers is 273 in the 67 districts reporting on this item.

What was the average per-pupil expenditure in your district in 1976-77 school year? (Please include all annual operating expenses but not capital outlay.)

Superintendents

Expenditures	n	%
500 or below	5	2
501 to 1,000	9	17
1,001 to 1,100	11	10
1,101 to 1,200	14	25
1,201 to 1,300	5	7
1,301 to 1,400	9	6
1,401 to 1,500	9	27
More than 1500	4	7

The weighted average annual expenditure in the 66 districts reporting on this item is $1250 per pupil.

Questions for Supervisors. Supervisors were asked to indicate their official titles. Approximately 16 percent of the secondary school supervisors reported they are department heads or chairpersons. Twelve to 18 percent of all groups said they are called supervisors or coordinators but approximately 20 percent are teachers. Other titles included assistant principal, principal, consultant, specialist, assistant superintendent, superintendent, and various director or administrator titles of areas such as curriculum and/or instruction, education, science, mathematics or social studies.

The wide diversity of titles and percentages devoted to supervisory activities reported below indicate that the title "supervisor" as used in the present study is somewhat ambiguous. Indeed, frequently this person is a teacher or administrator with only minimal responsibility for supervising activities. This is a result of the original RTI sampling procedure in which the target population of supervisors was constructed. Many districts do not have "curriculum supervisors" and thus the person most knowledgeable about the curriculum was so denoted for purposes of the RTI survey.*

Supervisors

What is your primary assignment?	K-6 Sci		K-6 Math		7-12 Sci		7-12 Math		7-12 Soc Stud	
	n	%	n	%	n	%	n	%	n	%
Curriculum Supervising	67	38	59	25	33	4	34	14	50	16
General Administration	31	22	25	42	11	13	16	17	17	13
Teaching	27	31	20	29	35	29	41	39	28	25
Department Head	1	0	1	3	8	36	4	0	10	8
Other	5	10	5	2	50	18	35	30	46	39

*Research Triangle Institute, A Proposal for Survey of Materials Usage in Pre-College Education in the U.S.: RFP 76-108 (Research Triangle, North Carolina, 1976).

What percent of fulltime employment do you devote to curriculum supervising, coordination, consultation with teachers on instruction and similar matters?

Supervisors

	K-6 Sci		K-6 Math		7-12 Sci		7-12 Math		7-12 Soc Stud	
	n	%	n	%	n	%	n	%	n	%
10% or less	28	22	18	26	26	56	30	30	34	32
11% to 25%	12	17	16	37	21	13	20	13	19	26
26% to 50%	24	18	21	16	19	9	19	14	14	14
51% to 75%	22	19	16	11	13	4	11	12	19	7
76% to 90%	15	4	14	7	13	2	10	2	29	17
91% or more	26	20	22	3	18	5	32	28	21	4

When asked to indicate their primary assignment, 38 and 25 percent respectively of elementary science and mathematics supervisors said that it is curriculum supervision. Smaller proportions of the secondary supervisors indicated this assignment. Varying proportions from 13 percent of the secondary social studies supervisors to 42 percent of the elementary math supervisors stated they are primarily assigned to general administration. Approximately 30 percent of all groups reported that they are assigned as teachers and 36 percent of secondary science supervisors are department heads.

The supervisors reported that they devote widely varying amounts of time supervising and coordinating activities. A majority of all groups devote 50 percent or less of their time to this endeavor. Weighted averages of the amount of time spent on supervising activities by the five groups in order of listing in the above table are: 54%, 32%, 22%, 48%, and 38%.

Do you supervise curricular matters in areas other than (science, math, social studies)?

Supervisors

	K-6 Sci		K-6 Math		7-12 Sci		7-12 Math		7-12 Soc Stud	
	n	%	n	%	n	%	n	%	n	%
Yes	86	67	65	79	47	65	53	59	64	55
No	44	34	45	21	86	35	75	41	82	45

Almost two-thirds reported that they supervise areas other than just the one for which they are reporting. Thus any comparisons between groups must be made with the reminder that each group, in reality, represents a mixture of school personnel with varying duties and discipline orientations.

Elementary supervisors in this sample stated that they provide consultation and aid to a slightly larger number of teachers than do secondary supervisors.

The two elementary groups reported they are responsible for a weighted average of 110 and 105 teachers respectively. Secondary science supervisors interact with the lowest number of teachers, a weighted average of 60, while secondary mathematics and social studies supervisors reported figures of 93 and 97 respectively.

This group appears to be quite experienced in working with teachers with science and mathematics personnel reporting weighted averages between 7 and 9 years of supervising activity. Secondary social studies supervisors have served in this capacity for an average of slightly over 5 years. Before assuming curriculum supervisory responsibilities over 65 percent of the elementary supervisors and the secondary social studies supervisors were engaged in teaching. Approximately 45 percent of the secondary science and mathematics teachers taught previously, and they were more inclined to have taught in their own disciplines. The weighted average number of years for those who taught is quite similar for all groups, ranging from 9.9 to 11.8 years.

Finally, the supervisors were asked whether or not they had attended National Science Foundation institutes, either in the summer or during the academic year. Only about a third reported such activity except for secondary science supervisors, of whom over 60 percent reported participation in NSF institutes. Of those who have attended NSF institutes, the weighted average number attended ranged from 1.6 for social studies supervisors, approximately 2.3 for both groups of elementary supervisors and those responsible for secondary mathematics, to 3.5 institutes per person for secondary science supervisors. It is quite possible that the NSF institutes are viewed by this group as primarily directed toward science teaching and supervising in secondary schools. The fact that a majority of our supervisors reported that they are responsible for areas other than just the one for which they were selected may also account for the lower attendance figures reported by the other groups.

Questions for Principals. Principals of schools with grades 7 through 9 were asked whether their schools were considered middle-schools or junior high schools and 77 percent reported the latter. Over half of all respondents stated they have been principals for 6 or more years; this proportion is larger than 80 percent for the junior high group. The weighted average number of years as principal was reported as 8.8, 11.5 and 5.5 for elementary, junior high and senior high schools, respectively. Most of the junior high group had previously served as principals of schools with other grade levels with 10 percent having been high school principals and 71 percent having been elementary principals. Before becoming principals, they had taught for a weighted average of 10.9, 16.2 and 8.5 years, respectively. Fourteen percent of junior high principals previously taught science as did 36 percent of the high school principals. Figures for previous mathematics teaching for these two groups were 12 percent and 43 percent, respectively.

Average student enrollment was reported as 392 in elementary schools, 582 in middle or junior high schools and 757 in high schools. The weighted average numbers of fulltime teachers were recorded as approximately 18, 27 and 37 respectively. However, there was a wide range of this variable. Only 8 percent

of elementary principals said there are more than 30 teachers in their school while 13 percent of junior high and 23 percent of high school principals reported more than 50 teachers.

What was the per-pupil expenditure in your district in the 1976-77 school year?

Principals

	Elementary		7-9		10-12	
	n	%	n	%	n	%
500 and below	8	16	3	37	1	3
501 to 1000	6	13	5	17	8	56
1001 to 1100	7	24	4	15	7	12
1101 to 1200	1	13	3	8	6	3
1201 to 1300	2	3	4	4	3	3
1301 to 1400	1	2	2	4	3	6
1401 to 1500	0	0	1	5	5	8
More than 1500	7	30	3	11	5	10

The weighted average per-pupil expenditures are $1155, $936 and $1082 as reported by the principals answering this item and are somewhat smaller in magnitude than that reported by superintendents.

Questions for Teachers. Seven groups of teachers were included in the survey: elementary teachers; science, mathematics and social studies teachers of grades 7 through 9; science, mathematics and social studies teachers of grades 10 through 12.

How many years have you been a teacher?

Teachers

	K-6		7-9 Science		7-9 Math		7-9 Soc Stud		10-12 Science		10-12 Math		10-12 Soc Stud	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
# of yrs.														
5 or less	17	26	24	20	25	25	9	23	13	18	21	14	6	15
6 to 10	24	30	28	42	18	21	13	32	37	36	27	53	18	51
11 or more	36	44	41	38	38	54	20	34	51	46	45	34	16	34
Wt. avg. # of yrs taught	11.4		11.2		12.7		10.0		11.1		10.2		9.9	
Wt. avg. # of yrs taught in specific discipline	N.A.		10.2		11.2		8.1		10.7		9.7		8.6	

The teachers responding to our survey are quite experienced, averaging over 10 years of teaching. Elementary teachers were asked the grade level they are currently teaching. Thirty (28%) teach kindergarten through second grade; 30 (20%) teach third or fourth grade; and 39 (47%) reported teaching fifth or sixth grade. The teachers of specific disciplines (science, mathematics and social studies) were asked how many years they had been teaching courses in their respective areas. The distribution of responses was quite similar to that for the number of years teaching in general as is evident from comparison of the average number of years taught and the average number taught in a specific discipline in the preceeding table.

Teachers in junior high and high schools were asked the number of courses that usually constitute a fulltime teaching load at their school. The majority of all groups indicated 5 to 6 courses; there is a very slight tendency for a lighter course load in grades 10 through 12 as evidenced by the slightly smaller averages for this group.

What is the usual number of courses for a fulltime teaching load at your school?

Teachers

	7-9 Science		7-9 Math		7-9 Soc Stud		10-12 Science		10-12 Math		10-12 Soc Stud	
	n	%	n	%	n	%	n	%	n	%	n	%
4 or less	30	38	15	29	9	35	27	39	24	34	10	22
5 to 6	51	57	56	66	28	59	63	59	66	66	28	78
7 or more	3	5	2	5	3	6	2	2	1	1	0	0
Wt. avg.	4.6		4.9		4.9		4.6		4.2		4.6	

Courses currently being taught by science teachers:

Course	7-9 Teachers		10-12 Teachers	
	n	%	n	%
General Science	37	35	5	4
Biology	15	13	58	50
Botany	0	0	4	2
Physics	7	10	18	25
Chemistry	5	7	26	25
Ecology	2	1	1	1
Math	4	3	5	5
Social Studies	1	1	0	0
Other	57	58	59	62

When asked to indicate the courses they were teaching during the Fall of 1977, general science was the most commonly taught course of those listed by science teachers of grades 7 through 9. It should be noted that the physics and chemistry courses listed by this group may be being taught by those who teach in schools having grades 10 through 12 in addition to grades 7 through 9. Exactly 50 percent of the high school science teachers were teaching biology courses. Physics and chemistry were each being taught by approximately one-fourth of this respondent group.

Courses currently being taught by mathematics teachers:

Course	7-9 Teacher		10-12 Teacher	
	n	%	n	%
General Math	42	51	39	45
Algebra	28	41	71	66
Geometry	10	20	44	63
Calculus	2	8	15	6
Remedial Math	0	0	3	2
Business Math	0	0	10	5
Advanced Math	0	0	12	12
Science	2	3	10	10
Social Science	1	3	0	0
Other	30	42	24	13

The course taught most frequently by mathematics teachers in grades 7 through 9 was reported to be general math, although algebra was indicated by over 40 percent of these teachers and geometry by 20 percent. These latter two courses were the ones taught by the largest proportion, over 60 percent, of mathematics teachers in grades 10 through 12. There were no teachers in grades 7 through 9 who reported teaching remedial or business mathematics and the incidence of these courses in high school was quite small.

Courses currently being taught by social studies teachers:

Course	7-9 Teacher		10-12 Teacher	
	n	%	n	%
American Govt/Civics	4	6	1	1
American History	14	40	21	51
Other history	3	23	14	42
Sociology	4	8	3	7
Psychology	1	2	5	11
Religion	0	0	0	0
Economics	2	3	1	2
Math	2	5	1	1
Science	3	6	1	9
Other	26	77	16	37

American history is the course most often taught by social studies teachers in both junior high and high schools. These teachers reported spending the majority of their time teaching history courses with only small proportions teaching in other social studies areas such as sociology, psychology and economics. No teacher reported teaching a course in religion during the present semester.

We asked all except the elementary teachers to tell us about their participation in science fairs and mathematics or science clubs. Almost 50 percent of science teachers report sponsoring such activities; approximately one-fourth of the mathematics teachers have also been sponsors of fairs or clubs. As expected, social studies teachers reported almost no activity in this area.

Have you ever been a sponsor for a science fair or science club or math club?

Teaching sample	Responding yes	
	n	%
Science: grades 7-9	49	47
grades 10-12	54	48
Mathematics: grades 7-9	17	25
grades 10-12	31	31
Social Studies: grades 7-9	4	7
grades 10-12	0	0

*"Rather than funding projects in curriculum reform, congress has stressed inservice programs to help teachers who are already in the schools. Administrators at NSF, such as Buccino and Hannabel, say they believe these inservice programs are the key to improving mathematics education. But some curriculum developers, such as Wilson and Fey, remark that this is a very political response. They point out that the NSF did not request funds for inservice programs in its current budget."**

All the teachers were asked about their participation in National Science Foundation institutes, both summer and academic year, and inservice courses. The proportion participating in NSF institutes has been about equal for teachers of given disciplines regardless of grade level taught. Approximately 40 percent of science teachers, 30 percent of mathematics teachers and only 10 percent of social studies teachers report having attended these institutes. The weighted average number varied from 1.3 institutes for social studies teachers (grades 7-9) and science teachers (grades 10-12) to 3.2 institutes for mathematics teachers of both grade ranges. Larger proportions reported participation in inservice and pre-service courses. Close to 50 percent of all groups indicated participation with over 70 percent of social studies teachers of grades 7 through 9 say-

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*Gina Bari Kolata, "Aftermath of the New Math: Its Originators Defend It," Science, 4 March 1977, pp. 854-857.

ing they have attended. The weighted average number of courses tends to be slightly higher for elementary and high school teachers, except for the high school mathematics teachers who reported the lowest average among all groups, 3.4. Thus, there is clear evidence that a substantial number of teachers, especially those in mathematics, have taken advantage of the NSF institutes. Even larger numbers reported continuing to upgrade their skills through attending inservice and pre-service courses. It is interesting to note that high school science teachers have the lowest average of NSF institutes attended and the highest average of inservice and pre-service courses. The situation is exactly reversed for high school mathematics teachers. It is regretable that reasons for this pattern of workshop participation were not investigated in the survey.

Participation in NSF institutes:

Teacher sample	Responding yes		Average number of institutes (weighted)
	n	%	
Elementary			1.7
Science: grades 7-9	39	41	3.0
Mathematics: grades 7-9	24	31	3.2
Social studies: grades 7-9	7	12	1.3
Science: grades 10-12	52	46	1.3
Mathematics: grades 10-12	38	31	3.2
Social studies: grades 10-12	4	10	2.5

Participation in inservice and pre-service courses in the last three years:

Teacher sample	Responding yes		Average number of institutes (weighted)
	n	%	
Elementary			8.2
Science: grades 7-9	42	48	5.3
Mathematics: grades 7-9	42	46	4.8
Social studies: grades 7-9	26	73	7.0
Science: grades 10-12	50	49	10.3
Mathematics: grades 10-12	44	53	3.4
Social studies: grades 10-12	20	42	9.2

Finally, we asked the teachers about their reading activities. Over 60 percent of all groups indicated that they read professional books and articles. Interestingly, the proportion was highest, 92 percent, for the elementary teachers. The average number of articles and books read varies considerably from one group to another with no clear pattern. Elementary, 7 through 9 mathematics, and 10-12 social studies teachers reported they read the largest number of general education articles. Elementary and 10 through 12 social studies teachers also read the largest number of general education books. In specific discipline areas, science teachers of all grades and social studies teachers of grades 10 through 12 reported the greatest reading activity.

Do you read the professional literature?

	Teachers													
	K-6		7-9 Science		7-9 Math		7-9 Soc Stud		10-12 Science		10-12 Math		10-12 Soc Stud	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	70	92	71	63	55	64	31	83	85	78	63	70	32	76
Wt. avg. number of educ. articles read each month	10.9		5.5		7.8		3.1		2.4		5.4		7.5	
Wt. avg. number of discipline-specific (science, math, social studies) articles read			12.1		4.7		1.1		8.4		4.1		7.7	
Wt. avg. number of educ. books read each year	9.2		5.1		3.2		2.9		0.8		2.0		6.3	
Wt. avg. number of discipline-specific (science, math, social science) books read each year			4.4		2.0		1.0		3.5		2.0		8.2	

Questions for Counselors. A small group of counselors was included in our survey. A counselor from each high school from the sample of principals of grades 10 through 12 was sent a questionnaire. They reported having a weighted average of 6.5 years experience as counselors. Thirty were males and 41 stated that they held counseling certificates. The tables of counselor responses contain both weighted percentages and, in parentheses, unweighted percentages.

How many years have you been a counselor?

	Counselors	
	n	%
Number of years		
5 or less	7	54 (16)
6 to 10	21	23 (49)
11 or more	15	22 (35)

	Counselors	
	n	%
Sex		
Male	30	52 (65)
Female	16	48 (35)

Do you hold a counseling certificate?

	Counselors	
	n	%
Yes	41	54 (93)
No	3	46 (7)

All of the 41 counselors who responded to the question indicated that they had taught before becoming counselors. They had taught a weighted average of 6.1 years. Approximately 10 percent indicated they had taught science or mathematics; 17 percent said they had taught social studies.

Area previously taught	Counselors	
	n	%
Science	7	11 (17)
Mathematics	5	9 (13)
Social studies	12	17 (29)

Thirty-nine of the counselors indicated that they spend all of their time in counseling activities. Only two said they devote less than 50 percent of their time to counseling.

Finally, we asked counselors to indicate the areas in which they primarily work. Forty indicated academic counseling; vocational and personal counseling was checked by 30 and 35 counselors, respectively.

In what areas of counseling do you work mostly?

	Counselors	
	n	%
Academic	40	53 (85)
Vocational	30	81 (64)
Personal	35	86 (74)
Therapeutic	3	5 (8)
Other	3	3 (8)

Questions for Students. Two questionnaires were developed for senior students but there were several identical questions on the first pages of both questionnaires. The combined sample size for the two groups of students was 736. The age and sex breakdown of the students indicates that 80 percent of the students are 17 years of age and they are almost equally distributed between males and females. Tables for students contain both weighted percentages and, in parentheses, unweighted percentages.

Age and Sex of Respondents

Age	Students n	%	Sex	Students n	%
16 or less	61	9 (8)	Male	374	51 (51)
17	599	80 (82)	Female	355	49 (49)
18 or more	72	11 (10)			

The seniors were asked about their future plans and over 70 percent indicated that they anticipate being in college next year. Twenty-one percent said they will be working while approximately 5 percent were planning to attend vocational school.

What is your best guess as to what you will be doing in October and November of 1978?

	Students n	%
Working	148	20 (21)
Traveling	12	3 (2)
College	498	71 (71)
Vocational school	38	5 (5)
Nothing	10	1 (1)

We also asked seniors to check science, mathematics and social studies courses they had taken previous to their senior year. In the science area, over 80 percent had taken biology and 62 percent had general science. Chemistry had been taken by 45 percent of these students while only 10 percent took a course in either physics or ecology. In mathematics, the two most common courses were algebra (85%) and geometry (76%). Basic math was checked by approximately 45 percent of the students while 36 percent indicated coursework in advanced algebra. Almost all students, 93 percent, said they have had a course in American history. American government and economics were checked by 24 percent and 20 percent, respectively. Thirty-five percent indicated coursework in religion and approximately 10 percent had taken psychology or sociology.

Please check the courses you have completed in grades 9, 10, 11:

Course	Students n	%	Course	Students n	%
Biology	643	84 (87)	Adv. Algebra	279	36 (38)
Physics	75	10 (10)	American Govt.	246	24 (33)
Chemistry	336	51 (46)	American Hist.	689	93 (94)
Ecology	74	11 (10)	General Science	458	62 (62)
Algebra	650	85 (88)	Sociology	91	8 (12)
Geometry	544	76 (74)	Psychology	102	10 (14)
Basic Math	339	46 (46)	Religion	101	35 (14)
Calculus	14	3 (2)	Economics	169	20 (23)

Approximately half of the student sample (n=361) were questioned on their attitudes regarding the science, mathematics and social studies courses they had taken. Students were fairly evenly divided on their opinion of what is most right about science courses, especially on the options of being interesting, stressing basic facts, having good books and equipment and having small classes. Forty percent said that the thing most right about math is that the basic facts are stressed while almost 50 percent said that social studies courses are interesting. The proportion that selected the option "down to earth" is very small for each discipline, indicating either that they are not down to earth or that there are much more important characteristics to consider.

What is the one thing that is most right about the (Science, Math, Social Studies) courses you have taken?

	Science		Math		Social Studies	
	n	%	n	%	n	%
The courses were interesting	106	20 (31)	61	12 (18)	155	50 (46)
The courses were "down to earth"	23	6 (7)	18	9 (5)	39	8 (12)
They stressed the basic facts	91	22 (27)	120	40 (35)	93	28 (27)
They stressed fundamental ideas	63	14 (28)	106	19 (31)	37	7 (11)
Books & equip. were very good	38	19 (11)	30	7 (6)	11	2 (3)
Classes have been small	21	19 (6)	16	13 (5)	5	6 (2)

What is the one thing that is most wrong about the (Science, Math, Social Studies) courses you have taken?

	Science		Math		Social Studies	
	n	%	n	%	n	%
The courses were boring	84	29 (25)	100	31 (31)	84	27 (26)
The courses were impractical	18	7 (5)	33	12 (10)	22	9 (7)
Overemphasized facts and memorization	78	24 (23)	65	13 (20)	112	40 (35)
Too much aimed at the "bright" kids	43	7 (13)	77	26 (24)	13	2 (4)
Books & equip. were inadequate	43	15 (13)	21	5 (7)	40	11 (12)
Not enough lab & project work	70	19 (21)	22	14 (7)	53	10 (16)

When asked what is most wrong about their courses, approximately 30 percent of the seniors stated that courses in all three areas are boring. Both science (24%) and social studies (40%) were criticized for overemphasizing facts and memorization. It is mathematics that is most often considered as being aimed at the "bright" kids, this by 25 percent of the students. This criticism is much less frequently noted for science and rarely for social studies courses.

Questions for Parents. The total number of questionnaires received from parents was 401. As discussed in the methodology section of the present chapter, questionnaires were mailed by the counselors to (one of) the parents of each student respondent. Thus the returns represent approximately 54 percent of the possible number, based on 736 completed student questionnaires. The breakdown of the parent sample by age and sex is presented below. The average age of the parents was 44.8 years and 63 percent of the questionnaires were completed by females. Unweighted percentages for parents are reported in parentheses following weighted percentages.

Age	Parents n	%	Sex	Parents n	%
Under 35	13	5 (3)			
36 to 40	96	24 (24)			
41 to 45	122	34 (31)	Male	152	37 (39)
46 to 50	86	16 (22)	Female	242	63 (61)
51 to 55	51	10 (13)			
56 to 60	16	6 (4)			
61 to 65	8	5 (2)			
66 or over	2	0 (1)			

In order to estimate the generalizability of findings from our parent sample to parents with children of other ages, parents were asked to indicate the grades in which they have other children. Over 40 percent reported having children in grades 7 through 9 and 45 percent stated they have other children in grades 10 or 11. Slightly less, 27 percent, have children of elementary school age. Additionally, 267 parents (56%) said they have children who have already completed high school.

Grades of Other Children	Parents n	%
K-6	146	27 (36)
7-9	174	43 (43)
10-11	167	46 (42)

Parents were also asked to indicate the highest grade they themselves had completed and to describe themselves with regard to their political views. Eighty-five percent of the parents indicated they have completed high school and 34 percent have college degrees (bachelor's or higher). Over 70 percent described themselves as conservative or middle-of-the road in their political orientation.

What is the highest grade you yourself completed?

	Parents n	%
K-8	19	4 (5)
9-11	43	11 (11)
12	143	34 (38)
1-3 years college	68	17 (18)
4 years college	73	27 (19)
MA, MS, etc.	26	6 (7)
Dr	9	1 (2)

How would you describe yourself with regard to your political views?

	Parents n	%
Conservative	140	42 (36)
Middle-of-the road	140	32 (36)
Liberal	73	11 (19)
Uncommitted	39	16 (10)

Finally, parents were asked to indicate the amount of attention they give to their 12th graders' school work and to the problems of their high school. The Ninth Annual Gallup Poll of the Public's Attitudes Toward the Public Schools* asked parents whether or not they help their children with homework. Fifty-one percent of public school parents and 49 percent of parochial school parents reported yes, either on a regular basis or when needed. Almost all the parents in our sample said they devote quite a bit of attention to this. Similar proportions stated that they attend to problems and affairs of their children's high schools.

How close attention are you able to give to your 12th grader's work in school?

	Parents n	%
No attention	18	3 (5)
A small amount	182	48 (47)
Quite a bit of attention	191	49 (49)

How much attention do you give the problems and affairs of that high school?

	Parents n	%
No attention	40	6 (10)
A small amount	209	45 (54)
Quite a bit of attention	142	48 (36)

General Questions of Selected Groups. As earlier noted, the first page of each questionnaire in addition to the demographic and experience-related questions, contained one or more questions of a general nature regarding science education. The items that appeared on questionnaires for two or more groups are summarized on the following pages. Responses of counselors, students and parents are presented with both weighted percentages and, in parentheses, unweighted percentages. Superintendents, high school counselors, high school science teachers and parents were questioned regarding the amount of agreement that exists on the aims and responsibilities of schools.

*George H. Gallup, "The Ninth Annual Gallup Poll of the Public's Attitudes Toward the Public Schools," Phi Delta Kappan 59 (September, 1977) :33-47.

Parents, students, and teachers--talking among themselves or with others--say what they want the schools to be doing. They say different things, but do they really disagree?

	Superintendents		Counselors		10-12 Sci Teachers		Parents	
	n	%	n	%	n	%	n	%
People disagree fundamentally as to the aims and responsibilities of schools	17	29	9	17 (21)	9	24	21	16 (15)
People agree pretty much in principle, but disagree as to how to do the job	44	55	26	69 (59)	27	57	97	52 (67)
People really are pretty much in agreement with each other as to these things	8	6	8	11 (18)	4	17	21	30 (15)
Other	3	11	1	1 (2)	1	2	4	2 (3)

A majority in each group stated that people agree in principle on what schools should be doing, but disagree as to how to do it. Almost 30 percent of the superintendents said that people do fundamentally disagree while a similar proportion of parents said that people really are pretty much in agreement on the responsibilities of schools.

Counselors and parents were also asked to comment on how they feel about the efforts that school officials make to find out what people want the schools to do. Counselors' most frequent remark was that their school officials make a good effort to find out people's interests and concerns, followed closely by the feeling that little or no effort was made. There was no other common response. Parents' most frequent comment by far was that school officials make little or no effort to find out what people want, and where they do make such an effort, it needs improvement. About half as many parents reported they are pleased with or find adequate the efforts their schools officials make. The next most frequent response was that school officials do make an effort to find out what people want but do not listen, or at least do not act on what they hear. Some people said the school officials decide what they are going to do without checking with the people and then try to get support for these decisions. A few parents suggested that students' opinions should be sought and considered. There was also a feeling expressed that school officials have made an effort and now the public needs to respond.

Preparation of students for coursework in high school and possible reasons for their unreadiness was the topic of two items proposed to social studies supervisors of grades 7 through 12, science teachers in grades 7 through 9 and senior students. A majority of the social studies supervisors stated that children are being properly prepared for high school while 62 percent of the science teachers disagreed. Seniors were about evenly divided on this question. When asked for reasons why students might be unready, over 50 percent of both supervisors and teachers said it is because they are lacking in motivation; only 21 percent

of the students agreed that this is a reason. Over 40 percent of supervisors and teachers and about 30 percent of students stated that elementary school programs have goals other than the preparation of students for high school. A majority of the students and one-third of the teachers indicated that one of the causes is the lack of emphasis on "content" in elementary schools.

Some high school teachers say that children are not learning enough in grade school. Do you feel this is true, that children are not being properly prepared for high school?

	7-12 Soc Stud Supervisors		7-9 Science Teachers		Students	
	n	%	n	%	n	%
Yes	67	37	58	62	186	39 (50)
No	66	52	23	31	131	40 (35)
I don't know	13	12	9	7	55	21 (15)

Think about those youngsters who are not ready for what high school teachers teach. What are <u>one or more</u> principal causes of their unreadiness?

	7-12 Soc Stud Supervisors		7-9 Science Teachers		Students	
	n	%	n	%	n	%
High school teachers expect too much	26	8	7	12	60	15 (16)
Elementary school teachers are poor teachers	6	0	4	3	30	6 (8)
Elementary school programs aim at other goals	75	42	44	46	131	31 (35)
The youngsters are lacking in motivation	64	56	59	59	103	21 (28)
Elementary schools emphasize "content" too seldom	39	20	27	34	183	56 (49)

Elementary school principals and principals of schools with grades 7 through 9 as well as parents were asked about grouping or tracking in schools. Elementary principals were evenly split on whether grouping of students with similar skills results in more effective instruction while principals of grades 7 through 9 and parents tended to believe that it does. A sustained and heavy emphasis on grouping is unfair to youngsters according to a majority of all three groups, ranging from approximately 70 percent of elementary principals and parents to 85 percent of principals of grades 7 through 9.

Do you feel that grouping youngsters of similar skills and experience into learning groups or tracks generally makes instruction more effective?

	Elementary Principals		7-9 Principals		Parents	
	n	%	n	%	n	%
Yes	31	46	23	62	92	56 (83)
No	22	47	10	28	16	43 (14)
Other	5	7	13	11	3	1 (3)

Do you believe it is unfair to some youngsters if there is sustained and heavy emphasis on such homogeneous grouping?

	Elementary Principals		7-9 Principals		Parents	
	n	%	n	%	n	%
Yes	44	70	32	85	58	69 (54)
No	13	29	13	14	45	28 (41)
Other	1	1	1	1	5	3 (5)

Considering both teaching effectiveness and fairness, which is the best policy?

	Elementary Principals		7-9 Principals		Parents	
	n	%	n	%	n	%
Put youngsters into tracks according to their learning ability	5	6	5	28	33	16 (30)
Don't use tracks but use grouping as much as is needed for good instruction	32	59	23	27	46	53 (41)
Occasionally use groups for a short while; occasionally group dissimilar kids	16	29	9	9	25	29 (23)
Except for very special activities, use no homogeneous groups for instruction	3	4	5	4	5	2 (5)
Other	2	2	4	32	2	0 (2)

Finally, these three groups were asked to select the best policy considering both teaching effectiveness and fairness. A majority of elementary principals and parents selected the option of using not tracks but grouping as much as necessary for good instruction; 29 percent say to group students only occasionally and then occasionally group dissimilar kids. Principals of grades 7 through

9 were more acceptant of the concept with 28 percent saying to track youngsters according to learning ability and another 27 percent agreeing to group for effective instruction.

In an open ended question, science and mathematics teachers of grades 7 through 9 were asked about any special efforts that are made to help students who have special talent in science or mathematics, respectively. Science teachers, responding to special efforts in science, noted extra-curricular activities and special incentives or privileges for science students. Mathematics teachers agreed with special incentives and privileges for mathematics students, but a majority also noted the use of special sections in mathematics. A number of teachers, approximately one-third in each disciplinary area, indicated that no special efforts are made, that all students are treated alike.

Elementary school mathematics supervisors, teachers and principals as well as science supervisors of grades 7 through 12 were asked about the background skills thought valuable for a curriculum supervisor. Mathematics supervisors and elementary teachers were specifically asked about mathematics supervisors while principals and science supervisors were asked about science supervisor skills. There was substantial agreement by all groups with the possibilities that were listed on the questionnaire. Those agreed upon by a majority of the respondents of all groups include recent fulltime teaching experience and knowledge of sources for curricular materials. A majority of all groups except elementary principals said that skill in diagnosing individual learning difficulties and an ability to "speak out" to protect the curriculum are also important skills for supervisors. The two groups of supervisors reported that they should have additional skills in interpreting test scores for classes or schools and the science supervisors said that administrative experience is helpful. Over half the principals wanted supervisors to be skilled in arranging inservice programs as did 50 percent of the mathematics supervisors. Over 60 percent of mathematics supervisors and elementary teachers also noted that knowledge of recent mathematical discoveries is an important skill for supervisors.

Which of the following background experiences or skills do you think are highly valuable for a mathematics (science) curriculum supervisor or coordinator? (Check as many as you wish)

	K-6 Math Supervisor		7-12 Sci Supervisor		K-6 Principal		K-6 Teacher	
	n	%	n	%	n	%	n	%
Recent fulltime teaching exp.	89	89	110	59	55	96	74	97
Administrative experience	51	45	64	58	22	35	18	20
Continuing enrollment in graduate math (science) courses	34	43	60	19	20	31	22	27
Having done curriculum research and development	56	36	79	26	23	35	33	36
Skill in diagnosing individual student learning difficulties	90	83	65	76	27	43	62	83
Skill in arranging inservice programs	84	50	88	38	43	73	38	45

Valuable supervisor skills, continued	K-6 Math Supervisor		7-12 Sci Supervisor		K-6 Principal		K-6 Teacher	
	n	%	n	%	n	%	n	%
Skill in interpreting test scores for whole classes schools	64	54	41	53	18	30	34	42
Knowledge of recent mathematics (science) discoveries	61	64	74	35	25	39	49	64
Knowledge of sources of curricular materials	97	82	119	89	50	89	60	71
Ability to "speak out" to protect the curriculum	64	68	88	73	23	35	46	64

Mathematics supervisors of grades 7 through 9 and teachers of grades 10 through 12 as well as high school principals were asked about the "new math" and the effort that was made to reform the mathematics curriculum. Over a third of the principals and approximately one-fourth of the supervisors and teachers stated that the new math was a waste of time and money. A similar proportion of principals and a large number of supervisors (38%) said that it was probably the right thing to do, given the national situation; only 17 percent of mathematics teachers agreed. Of those who indicated that this movement tried to deal with the "grand sweep of things," they were about evenly divided as to whether that was good or bad. Of those who agreed that it placed a greater emphasis on formal logic, a large number of supervisors and teachers said this was a good attribute. Supervisors especially (37%) responded that the curriculum reform effort ignored the realities of time and cost to make such a change. The responses to this question indicate considerable diversity of opinion within each group regarding the new math curriculum reform effort.

Modern math was taught for a while in a few classes in many schools. The regular textbooks now incorporate ideas from the "new math." But the old math survived. How do you feel now about the effort to reform the curriculum? (Check any number of times)

	7-12 Math Supervisors		10-12 Principals		10-12 Math Teachers	
	n	%	n	%	n	%
It was a waste of time and money	9	23	14	36	28	28
Given the national situation, it was probably the right thing to do at the time	63	38	24	32	29	17
It tried to deal more with the grand sweep of things which was						
good	35	28	6	15	13	12
bad	31	37	6	10	17	14
It placed a greater emphasis on formal logic, and that was						
good	64	32	9	8	30	50
bad	15	11	6	17	14	21
It did not attend to the realities of time, costs, etc., involved in such a change	39	37	17	13	22	20
It gave a certain pride to math teachers, a pride which is missing now	18	11	5	6	5	3

A question administered to superintendents, science teachers of grades 10 through 12 and parents asked about the effect of declining enrollments in science. Substantial majorities of each group stated that this national trend will have a negative effect on almost all of the effects listed. These include the growth of technology, economy and "quality of life." Slightly smaller proportions, but still over 50 percent of all groups except science teachers, said that there will also be a negative effect on the military preparedness in this country. When asked if the schools should do something to reverse the trend of declining science enrollments, the answer was overwhelmingly affirmative. Thus, at least from a futuristic point of view, all three groups agreed that the decline in science education will have deleterious effects and that this decline should be reversed.

For many students the science goal "understanding the world in which we live" seems remote and impractical. Students now enroll in few science courses unless required to. Less science is being taught now than in earlier years. Do you think this national trend will have serious negative effect on...

...the growth of technology in our society?

	7-12 Math Supervisors		10-12 Sci Teachers		Parents	
	n	%	n	%	n	%
Yes	50	74	77	85	91	65 (73)
No	18	20	21	12	20	11 (16)
Don't know	5	7	2	3	14	24 (11)

...the economy of our country in years ahead?

Yes	45	71	67	83	82	73 (66)
No	17	19	21	11	24	14 (19)
Don't know	11	10	12	7	19	13 (15)

...military preparedness in this country?

Yes	32	57	47	44	61	51 (50)
No	26	32	35	35	31	17 (25)
Don't know	14	10	18	21	30	33 (25)

...the "quality of life" in this country?

Yes	45	79	83	90	87	77 (70)
No	17	14	14	8	23	13 (18)
Don't know	10	6	3	2	15	10 (12)

Should schools try to do something to reverse the trend away from science?

	7-12 Math Supervisors		10-12 Sci Teachers		Parents	
	n	%	n	%	n	%
Yes	59	88	88	93	61	80 (69)
No	9	5	9	5	26	19 (30)
Don't know	6	7	2	2	1	1 (1)

RESPONSES TO SCENARIOS

The scenario portion of the questionnaire used an unusual concept in survey methodology. Various issues of pervasive concern were detected by the case study authors and site visitors in the eleven case study locations. A major purpose of the questionnaire was to evaluate the generality of the case study findings. A method was sought that would allow the formation of questions with categorized answers while preserving the complexity of the issues involved. Thus the scenario format was utilized as a technique to provide a setting against which relevant questions could be posed.

The many issues of science education were reduced and refined to eight fairly specific topics. A scenario was developed for each of the eight issues and consists of a contrived illustration, designed to establish the issue in proper context, and a number of questions relating to the issue portrayed in the illustration.

It would have been impossible to request all respondent groups to react to each scenario; such a procedure would have resulted in a questionnaire of unacceptable length. Accordingly, each scenario was included as a portion of the questionnaire to two, three or four of the twenty-two respondent groups. An attempt was made both to assign scenarios to groups with special interest in the particular issue and to assure that a variety of groups were queried on each issue.

As with all analyses in the present chapter, results are reported by both the actual frequencies of responses and the weighted percentages calculated on the sampling weights provided by the Research Triangle Institute. Standard errors are presented in Tables 18-1 and 18-2. As earlier noted, the weighted percentage responses for counselors, students and parents do not take the entire sampling procedure into consideration and thus must be interpreted with extra caution. Consequently, both weighted and unweighted percentages for these three groups are presented with the unweighted percentages in parentheses following the weighted percentages. Throughout the discussion of results, however, only the weighted percentages will be referred to. Percentages are based upon the number of persons who responded to a given question. Responses to most open-ended questions are reported only by actual frequencies of responses since many of these comments were analyzed manually.

Each scenario is printed in its entirety along with the responses to questions in this section of the survey results. Effort has been made to present the illustration portion exactly as it appeared in the questionnaire; however, the format of the questions has been altered in order to present findings in a tabled fashion.

Scenario S: Budget Cuts. A tightening of funds and the consequent effect on educational programs is a critical issue to educators and parents alike. The

Ninth Annual Gallup Poll of the Public's Attitudes Toward the Public Schools* reports that lack of proper financial support was rated third in the list of top problems with which public schools must deal with 12 percent of the 1506 persons responding indicating this as a problem. As is discussed elsewhere in this chapter, the respondents in this survey indicated that budget problems and priorities is the biggest problem facing public schools when one-third of our sample was queried on this question. Scenario S was developed to assess opinion on budget cuts and possible ways to deal with decreased financial resources for education. This scenario was administered to superintendents, science supervisors of grades 7 through 12 and one group of parents. Response rates were 74 of 149 (50%), 139 of 200 (70%) and 111 of an estimated 250 (~44 %), respectively.

* * * * * * * * * * *

Please consider this situation:

School District No. 22 is facing key decisions regarding its programs. Funds are short. Rising energy costs and personnel salaries consume increasing proportions of revenues. Upcoming reassessments of real estate are provoking property owners into further resistance to reliance on the property tax for school funding. They are opposing an upcoming referendum on issuing additional revenue bonds. Financial aid from the state is based on formulas tied to average daily attendance, and for various reasons, attendance has been dropping each year. At least one school may have to be closed.

The staff is aggressive in seeking special state and federal programs that bring extra funds, but these funds only cover a small share of the total burden. A few teachers have been laid off, orders for new books have been cancelled, and laboratory work and field trips have been cut back. Art, music and athletic programs have been trimmed. Still the funds available will not meet the projected expenses.

The economic picture in the community is not particularly bleak. About 5% are unemployed. McDonald's is always trying to hire more teenagers. Filling stations and some shops have closed, but new businesses have been opening too. Sales of machinery, land, recreation vehicles and citizen-band radios have been going strong for quite a while.

A small number of citizens want to raise taxes to pay for a full and undiminished academic program. A clear majority does not. Some opponents claim the schools waste taxpayer money with frill courses, open classrooms, alternative teaching, and electives. Some claim that too much is being spent for administrators, curriculum coordinators, counselors, social workers and various office people.

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*George H. Gallup, "The Ninth Annual Gallup Poll of the Public's Attitudes Toward the Public Schools," Phi Delta Kappan 59 (September 1977): 33-47.

Generally speaking and not with regard to particulars, how similar is the District 22 situation to the situation in your own school district?

	Superintendents		7-12 Science Supervisors		Parents	
	n	%	n	%	n	%
quite similar	25	37	62	26	55	23 (51)
not very similar at all	43	60	51	67	43	65 (40)
other	60	2	23	7	9	13 (8)

This scenario was developed on the basis of economic conditions encountered in the case study sites. There was frequent talk of budget contraints. Only about one-fourth of the survey respondents to this scenario found the collage of conditions descriptive of their district. They were asked to elaborate on the similarities and/or dissimilarities in the following two questions.

What in this description of District 22 is particularly relevant to the situation in your own district?

What important differences are there between District 22 and your situation?

Parents made very few comments. Science supervisors and superintendents responded frequently with similar trends and proportions among their comments. The most frequently mentioned similarities between their own situations and District 22 were cutbacks in programs, decreases in attendance, teachers laid off or not replaced and shortages of funds. Comments that taxes are wasted by frill courses and too many administrators and concern with rising energy and personnel costs resulted in stated opposition to increasing taxes to support schools.

Major differences mentioned by superintendents included stability in attendance, no program cutbacks and no teachers being let go. Many said they enjoy community support for good school programs and several districts reported growing and expanding programs. Supervisors' comments were quite similar with the additional remark that there is no shortage of funds at the present time. In both respondent groups a few people noted that the economic picture in their districts is bleaker than in District 22. Thus, although a majority responded that the scenario representation is not similar to their own situation, in every detail, it would appear that economic constraints are seen to be serious problems as indicated by our field observers. Thus, there appear to be mixed reactions.

As enrollments drop and fewer courses are offered, teachers in some districts are involuntarily reassigned to other departments or to other schools.

Has this happened in your district?

Teachers reassigned, continued	Superintendents		7-12 Science Supervisors		Parents	
	n	%	n	%	n	%
Yes	34	54	70	62	29	22 (26)
No	37	45	59	29	36	40 (33)
I don't know	3	1	6	9	45	38 (41)

Involuntary reassignment appeared to be fairly common, although a smaller percentage of parents note this consequence of enrollment drops. If respondents answered yes, they were asked to elaborate further on the issue of reassignment. Following are the number and percent who answered yes to each question.

	Affirmative Responses					
	Superintendents		7-12 Science Supervisors		Parents	
	n	%	n	%	n	%
Are teachers being given reassignments outside their certification?	5	15	18	45	4	3 (6)
Are reassigned teachers finding the new departments or schools hospitable?	27	40	48	32	9	26 (14)
Is it regularly the most recently hired teachers who are reassigned?	24	34	36	49	19	34 (28)
Is reassignment a much larger issue due to your collective bargaining agreement?	16	14	21	16	4	4 (8)

Science supervisors of grades 7 through 12 (45%) stated that teachers are being reassigned outside their certified areas and that it is the most recently hired teachers who tend to be reassigned (49%). Much smaller proportions of superintendents checked these options. Slightly more (40%) superintendents agree that reassigned teachers find new departments or schools hospitable. Reassignment is not a critical issue in collective bargaining, probably because it is viewed as part of the larger issue involving seniority and tenure concerns.

The following items were posed to determine the prevalence of budget cuts and their consequences and the action that would be preferred in the case of drastic cuts.

In what ways have budget cuts in your district seriously affected the science curriculum?

	Superintendents		7-12 Science Supervisors		Parents	
	n	%	n	%	n	%
We have not had budget cuts recently	34	52	62	32	47	76 (42)
The science curriculum has not been seriously affected in any way	38	48	56	19	35	41 (32)
Classes have been made larger in size	7	4	50	17	17	4 (15)
Needed and highly qualified teachers have been "let go" and not replaced	4	6	10	2	5	3 (5)
We have more teaching from textbooks, less with projects and lab work	7	4	41	17	14	5 (13)
No longer can we provide a textbook for each student individually	0	0	15	4	3	1 (3)
The inservice training program has been cut back substantially	10	16	18	3	6	1 (5)
Other	10	16	18	43	9	3 (8)

A majority of superintendents and parents reported no recent budget cuts and large portions, 48 and 41 percent respectively, indicated no effect on the science curriculum. Supervisors, however, appeared to disagree with only 19 percent reporting that budget cuts have not affected science curriculum. Other consequences especially noted by supervisors were larger classes and more textbook teaching, both 17 percent. Under other comments, cuts in budgets for equipment and supplies that result in the reduction in purchases of new materials and equipment were noted; money is unavailable for anything other than books. Finally, cutbacks in lab assistants and, consequently, on lab experiences for students were listed as other consequences of budget constraints.

Suppose you live in a district which must make drastic cuts in the school budget. Give a rank of "1" to the action you would consider most acceptable, a "2" to the next, on down to a rank of "8" to the action most unacceptable to you.

	Rank first or second					
	Superintendents		7-12 Science Supervisors		Parents	
	n	%	n	%	n	%
A 15% reduction in funds for administrative salaries	14	10	55	32	49	39 (62)
Weighted median rank	4.4		3.8		2.2	
A 3% reduction in funds for teacher salaries	16	15	25	11	38	36 (40)
Weighted median rank	4.3		3.4		4.8	
A five year moratorium stopping purchase of new books and materials	13	21	19	17	16	27 (17)
Weighted median rank	4.4		6.3		3.4	

Ranking of budget cuts in order of acceptability, continued	Rank first or second						
	Superintendents		7-12 Science Supervisors		Parents		
	n	%	n	%	n	%	
Elimination of all extra-curricular activities except sports	34	63	53	59	31	40	(32)
Weighted median rank	2.1		2.3		3.0		
Elimination of the athletic program	32	67	47	19	21	28	(22)
Weighted median rank	2.2		4.6		4.5		
Elimination of the foreign language and bilingual education programs	11	27	23	58	20	20	(21)
Weighted median rank	5.6		1.9		4.8		
Elimination of the locally-funded assistance to handicapped children	2	3	15	6	9	5	(10)
Weighted median rank	5.2		6.0		7.0		
Elimination of all physics and chemistry courses	3	9	2	1	4	1	(4)
Weighted median rank	7.0		7.8		7.1		

The most desirable action in parent responses to budget cuts was a 15% reduction in administrative salaries (median rank 2.2). Also considered relatively acceptable by parents were elimination of extra-curricular activities except sports and a five year moratorium on purchase of new textbooks and materials. This last option was ranked much lower by supervisors; perhaps parents tended to see the curriculum as more static. Secondary school supervisors ranked elimination of foreign language and bilingual education programs as the first to be cut. This choice ignores the fact that bilingual programs are primarily funded from funds external to a district. They, along with superintendents, also ranked elimination of all extra-curricular activities except sports as relatively acceptable. Superintendents also chose elimination of the athletic program, although it is possible that this is a popular "pressure-tactic" choice.

The least acceptable choice to all three groups was elimination of all physics and chemistry courses. It may be speculated that this is because of the importance of these courses, but it may also be that they feel the elimination of these courses would not result in the same amount of savings as would some of the other options. Our respondents also may have been influenced by the sponsor of the survey. Many respondents in all three groups found none of the alternatives acceptable. Several suggested making multiple compromises such as cutting back slightly on all items rather than eliminating any one area.

Finally, these groups were asked to respond to several questions concerning youth unemployment and vocationally oriented coursework.

Here are questions about youth unemployment and school curriculum.

Science courses should be aimed (more than they are) at vocational goals.

	Superintendents		7-12 Science Supervisors		Parents	
	n	%	n	%	n	%
Agree	38	59	69	34	67	64 (60)
Disagree	27	27	52	28	16	14 (14)
Uncertain	7	15	17	38	28	22 (25)

Many youngsters are not ready for work, but the big problem is the scarcity of jobs, not what the schools are doing.

	Superintendents		7-12 Science Supervisors		Parents	
	n	%	n	%	n	%
Agree	36	63	59	63	50	49 (45)
Disagree	22	12	52	25	18	24 (16)
Uncertain	13	26	26	11	43	28 (39)

Schools should be teaching youngsters how to get a job and how to keep it.

	Superintendents		7-12 Science Supervisors		Parents	
	n	%	n	%	n	%
Agree	55	72	87	34	77	79 (69)
Disagree	10	6	33	16	7	1 (6)
Uncertain	8	23	16	50	27	20 (24)

Most employers do not expect a new worker to be ready for the responsibility of a particular job, no matter how well they have done in high school.

	Superintendents		7-12 Science Supervisors		Parents	
	n	%	n	%	n	%
Agree	30	38	48	16	47	30 (43)
Disagree	36	41	78	78	12	31 (11)
Uncertain	7	21	13	6	51	40 (46)

Slow learners should not be required to take a science course in high school.

	Superintendents		7-12 Science Supervisors		Parents	
	n	%	n	%	n	%
Agree	4	7	15	7	16	25 (14)
Disagree	66	92	119	93	16	4 (14)
Uncertain	3	1	5	1	79	71 (71)

If there is not enough money for both, high schools should offer good general education rather than good vocational education.

	Superintendents		7-12 Science Supervisors		Parents	
	n	%	n	%	n	%
Agree	42	66	97	79	73	76 (66)
Disagree	18	25	26	14	9	3 (8)
Uncertain	10	9	15	7	28	20 (26)

A majority of superintendents and parents stated science courses should be aimed more at vocational goals. While substantial proportions of all groups said that the big problem is with scarcity of jobs for youth, over 70 percent of superintendents and parents stated that schools should teach youngsters how to get and keep a job. Yet large majorities of all groups would opt for a good general education as opposed to vocational if a choice had to be made. Apparently, the choice between general and vocational education is clear, but there is still a large concern for the latter. Finally, overwhelming proportions of superintendents and supervisors thought that slow learners should not be exempted from high school science courses. Parents were not so sure on this issue with 71 percent indicating that they are uncertain.

Scenario T: Uniformity. Chapter 14 of this report considers, in detail, the issues of pluralism and uniformity, an important topic both in conversations during case study research and in the current educational literature. Goal setting, having similar goals for all schools and minimum competencies are all related to this emphasis on uniformity. Scenario T, presented as correspondence among parents, teachers and administrators, was developed to probe the generality of these concerns. Science supervisors, this time for elementary grades of kindergarten through 6, principals of schools with grades 10 through 12, and parents were asked to respond to this scenario. Response rates for these groups were respectively 134 of 210 (64%), 54 of 87 (62 %) and 142 of approximately 250 (~ 57%).

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Please consider the following "correspondence."

Dear District Administrator,

The PTA-Council is thinking that it would like to set the theme for next year's meetings as something like "Putting the Curriculum in Uniform." We want to stress the need for uniformity of teaching across the district and the need for encouraging learning that leads to good employment opportunities. Please let me know your reaction to this tentative choice.

Respectfully, Willa Petrun, President

Dear Mrs. Petrun,

You will be hearing from others on the staff. For myself, I am pleased with your choice. Discussion on this theme will help draw attention to our objectives-based curriculum and the importance of providing equal opportunity for learning in each of our schools. If we are going to be fair, we must be uniform.

Sincerely, Jarvis Shattuck, Superintendent

Dear Willa,

I look forward to working further with the Council. I think the title, "Putting the Curriculum in Uniform," is corny and hope you find a better one, even if the topic is "uniformity."

I am disappointed, I must admit, that you did not choose the theme sponsored by Mr. Perez, "Where is our Science Program?" I feel that more emphasis on uniformity is going to further erode support for our college-prep program. We have lost support from the Board because we do not have their endorsement on a set of objectives for the sciences. They don't fund what we don't specify. I hope the Council will give Mr. Perez's proposal further review.

Your "favorite" science teacher, Foster

Dear Ms. Petrun:

Thank you for giving us the opportunity to influence your consideration of themes for next year. In as much as the state legislature will be voting on bills to create a Competency-Based Diploma, I think we should review our entire philosophy of curricular uniformity in the district.

Uniformity could be an obstacle to providing an educational program tailored to each student's home-culture, talents, and aspirations. Uniformity could diminish the flexibility we have had in our alternative school and magnet school. We should be discussing uniformity this year, and of course, we should recognize that too much of it can be as troublesome as too little.

Yours truly, Mavis Cooper, Principal, Central School

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These letters summarize some of the concern about the curriculum. Some people are wanting courses to be more uniform, so that, for example, all sixth grade math courses and all American history courses are alike. What do you think about it?

	K-6 Science Supervisors		10-12 Principals		Parents	
	n	%	n	%	n	%
I think that much more uniformity is needed	27	23	12	11	56	31 (41)
I am opposed to a high degree of uniformity	58	53	24	50	57	47 (41)
I would like more uniformity, but getting it will cause problems too	28	17	10	18	20	8 (14)
Other	16	8	7	21	5	15 (4)

Approximately half of the persons responding were opposed to a high degree of uniformity although about one-third of each group either desired more uniformity or would do so if it did not cause problems. An item related to the question of ethics of uniformity versus pluralism and a sample of responses was asked next.

Superintendent Shattuck implied that the same courses in different schools have to be alike if the school system is to be fair. Do you believe this is so?

Supervisors and principals gave three times as many negative responses as positive. Parents, in the majority of their responses, however, agreed that schools should be alike if the school system is to be fair. The parents responded more often with a simple yes or no than supervisors and principals who tended to elaborate on their responses. The most frequent qualification to affirmative responses among all three groups was that while uniform minimum standards could be set, the individual differences among teachers, students, and schools would make it impossible and undesirable for programs and outcomes to be the same. Parents also mentioned that uniformity within courses would facilitate adjustments when children move or transfer from one district to another.

The role of parents was especially of concern in the next item. Here, and elsewhere in the questionnaire, an attempt was made to solicit attitudes about other peoples' perceptions, but the respondents were rather reluctant to provide these, as evidenced by the number of "Don't know" answers. In general, the groups responded similarly with about one-third stating that parents have a large voice in school goals. Within each response group there was apparent lack of consensus on the issue of the manner in which school officials respond and whether or not more uniformity is desired by parents.

In your own community, generally speaking . . . how large a voice do parents have in school goals?

	K-6 Science Supervisors		10-12 Principals		Parents	
	n	%	n	%	n	%
Large	47	35	19	38	31	31 (24)
Small	75	52	32	61	84	56 (66)
None	7	13	2	6	13	12 (10)

do school officials respond as these three did here?

	K-6 Science Supervisors		10-12 Principals		Parents	
	n	%	n	%	n	%
Yes	64	56	31	43	41	33 (32)
No	25	27	12	38	26	20 (20)
Don't know	30	18	9	19	61	47 (48)

do most parents want more "uniformity" across schools?

	K-6 Science Supervisors		10-12 Principals		Parents	
	n	%	n	%	n	%
Yes	65	42	26	35	53	28 (39)
No	15	23	9	32	18	24 (13)
Don't know	39	36	16	33	64	48 (47)

The three items following were designed to determine the number who agreed with the different positions indicated by various correspondents in the scenario.

Do you agree with the concerns Mavis Cooper raised with regard to "uniformity?"

	K-6 Science Supervisors		10-12 Principals		Parents	
	n	%	n	%	n	%
Yes	104	83	46	97	90	76 (66)
No	22	15	4	2	34	16 (25)
Other	4	2	2	1	13	9 (9)

Foster seems also to be suggesting that the science curriculum is competing with the objectives-based curriculum--rather than being supported by it. Do you feel that funding for the one, if spent properly, would support the other? Or do you feel that districts just have to make hard choices between traditional and objectives-based studies?

Traditional versus objectives-based curriculum, continued

	K-6 Science Supervisors		10-12 Principals		Parents	
	n	%	n	%	n	%
The methods and goals of traditional and objectives-based curricula are relatively independent; therefore, they compete for funds.	11	15	6	21	53	44 (43)
The methods and goals of traditional and objectives-based curricula are highly related; therefore, they do not really compete for funds.	108	84	39	67	65	53 (53)
Other (please indicate)	2	0	2	10	5	3 (4)

Do you agree with Willa Petrun that schools should give more emphasis to studies that lead to employment opportunities?

	K-6 Science Supervisors		10-12 Principals		Parents	
	n	%	n	%	n	%
Yes	88	57	41	78	107	73 (80)
No	29	21	7	17	21	24 (16)
I don't know	12	22	4	4	6	4 (5)

An overwhelming majority agreed with the principle that uniformity can be an obstacle in providing educational programs tailored to each student , and high proportions did not think that traditional and objectives-based curricula are in conflict and thus compete for funds. In both cases, the proportion of parents agreeing was slightly less than K-6 science supervisors and 10 through 12 principals. Again, as in the scenario on budget cuts, we see a substantial concern for employment related coursework, although this concern is not quite so evident among the science supervisors.

In one city recently, science teachers in elementary, junior high and senior high schools expressed a strong desire to clarify what should be taught in each grade. What do you think are major reasons teachers seek such clarification? (Check one or more)

	K-6 Science Supervisors		10-12 Principals		Parents	
	n	%	n	%	n	%
To make their jobs more manageable	67	44	28	72	63	47 (44)
To locate the blame when deficiencies are found	15	8	12	34	32	19 (23)
To make clear to students what is expected of students	79	54	33	59	72	49 (51)

Major reasons for course clarification, continued	K-6 Science Supervisors n	%	10-12 Principals n	%	Parents n	%
To persuade Board and Community to support some areas better	9	6	6	6	29	17 (20)
To select the best materials from the huge supply	47	35	17	28	47	38 (33)
The reasons are different from community to community	33	43	19	24	36	21 (25)
There really are no reasons; maybe it's a "panic" response	5	4	1	1	10	5 (7)
Other (please specify)	28	23	9	9	7	3 (5)

When there is an expressed desire on the part of teachers to clarify goals, what are the possible motivations? Substantial proportions, especially of 10 through 12 principals, said this desire is due to a need to make the job of teaching more manageable. Other reasons that were checked by a proportion significantly greater than zero include locating the blame (principals and parents only), making expectations clear to students (approximately half of all respondents), and assisting in text selection (approximately one-third of the respondents). Significant proportions, although smaller for principals and parents than for science supervisors, stated that the reasons for goal clarification differ from one community to another. The "other" responses given by supervisors were primarily related to assuring continuity or articulation through all grades. This was a concern both in planning the curriculum to avoid duplication and in the classroom so teachers will know what their students have been taught previously.

The Eighth Annual Gallup Poll* (1976) reported that 65 percent of people believe high school students should be required to pass a standard nationwide examination for graduation. This is a substantial increase over 50 percent who responded similarly in 1958. An indication of the national interest generated by this issue, as noted by Nolan,** is the proposal for a national test in reading, writing and mathematics by the Chairman of the State Subcommittee on Education.

Should school districts set some minimum competency in science for all students to attain in order to graduate from high school?

	K-6 Science Supervisors n	%	10-12 Principals n	%	Parents n	%
Yes	85	69	41	70	90	77 (71)
No	32	21	10	27	24	18 (19)
I don't know	15	10	3	3	13	5 (10)

*George H. Gallup, "The Eighth Annual Gallup Poll of the Public's Attitudes Toward the Public Schools," Phi Delta Kappan (October, 1976): 187-200.

**David M. Nolan, "Washington Notes: National Standards," NCME Measurement News, 20-111:7 (Fall, 1977).

The high proportions agreeing with this statement may be partially due to the fact that control might be vested in local school districts as opposed to a nationwide examination. Even so, the support for minimal competency in science is impressive and might be taken as a general commitment to the importance of science in our society. On the other hand, it must be cautioned that the preceeding question does not define the term "minimum competency" nor does it indicate any costs or benefits of implementing such a program. It may be simply that the responses are much more indicative of a desire to set tougher standards for high school graduates. Science is already required and the above respondents may be reaffirming their commitment to retain that requirement.

It should be noted that an identical question appeared on one of the three fourth pages and was responded to by representatives from all groups. Agreeing were 70 percent of the supervisors, combined across all grades and disciplines, and 67 percent of the parents, proportions similar to those preceeding. However, a combined group of superintendents and principals of all grade levels responded "yes" in only 37 percent of the cases, indicating less agreement by the superintendents and principals of grades other than 10 through 12.

Please rank the importance of responsibilities of a science curriculum supervisor--as you would like it to be. Rank "1" as the most important on down to "5" as the least important.

	Ranked first or second					
	K-6 Science Supervisors		10-12 Principals		Parents	
	n	%	n	%	n	%
Assist teacher with problems they are having with teaching	117	89	42	87	60	41 (47)
Weighted median rank	1.3		1.4		2.5	
Supervise the collection of student performance data	3	4	3	8	15	7 (12)
Weighted median rank	4.2		4.7		4.0	
Assure that a high level of subject matter is maintained	36	34	28	61	93	69 (74)
Weighted median rank	2.9		2.2		1.4	
Provide information about different teaching methods and materials	99	73	29	45	65	63 (53)
Weighted median rank	2.1		2.8		2.2	
Assist administrators in getting funding for programs	6	1	2	1	22	12 (18)
Weighted median rank	4.6		3.8		4.5	

There is at least some small disagreement over what supervisor responsibilities should be as evidenced by the above rankings. Secondary principals and elementary science supervisors assigned assisting teachers with problems they are having with teaching the highest rating while parents chose assuring maintenance of a high level of subject matter. This choice was ranked second by

supervisors and third by principals. All three groups indicated that providing information about different teaching methods and materials is important, although not the most important responsibility.

> In your district, who is the person (or who are the persons) most knowledgeable about whether the curriculum needs improvement of one kind or another?

Kindergarten through 6 science supervisors thought those most knowledgeable about the curriculum were the classroom teachers, followed by curriculum personnel, principals and superintendents. High school principals felt they knew most about needs for curriculum improvement, followed closely by teachers and curriculum personnel. Parents thought teachers were most knowledgeable, followed by principals and superintendents. Curriculum personnel were mentioned far less by parents, perhaps indicating that many are not aware of the role of curriculum coordinators or supervisors in the schools or districts. Many parents responded, "I don't know." Parents, high school counselors, students and the school board were given occasional mention. Parents were the only group to mention employers in the business and industrial community as knowledgeable about the school curriculum because they are hiring former students.

Scenario U: Back to the Basics. Hand in hand with the question of examinations for minimal competencies is the emphasis on basic skills. The "basics" are often regarded as reading, writing, and arithmetic--the case studies indicate that the current definition primarily refers to simple reading and arithmetic skills. Chapter 13 elaborates the issue of back to the basics and how these skills are being viewed.

In the 1977 Gallup Poll,* 41 percent of all parents had heard of the back to basics movement in education. Interestingly, many parents in that poll also saw the movement as a back-to-the old fashioned ideas--of discipline in the school room and of teaching methods. Of those who were aware of the phrase, an overwhelming majority of 83 percent reported that they approved of the movement.

A scenario was designed using a setting of two teachers at a curriculum workshop to explore the back to the basics issue in the context of writing objectives. This scenario was presented to the social studies supervisors of grades 7 through 12, elementary school principals (K-6), and to mathematics teachers of grades 10 through 12. Response rates for these three groups were 153 of 201 (76%), 59 of 94 (63%), and 94 of 150 (63%) respectively.

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*George H. Gallup, "The Ninth Annual Gallup Poll of the Public's Attitudes Toward the Public Schools," Phi Delta Kappan 59 (September 1977): 33-47.

Please consider this dialogue between two teachers, Maria and Jim, at a curriculum workshop:

Maria: It's a lot of work, but I'm glad we are specifying just what our curriculum is. The more specific we are the better. It should help us concentrate on teaching the basic skills.

Jim: But are we really describing the old curriculum or creating a new one? With the new mastery requirements will we have time to do enrichment projects and science explorations?

Maria: We've spent too much class time on field trips and science fairs. We must set our priorities and spend the time where it should be spent: on reading, writing and arithmetic. Knowing what we need to teach will help us use tests to make sure we did it. We will eliminate the irrelevant topics and unrealistic goals.

Jim: I'm not that optimistic. Three summers ago I revised a course using behavioral objectives. But in the fall I felt tied down to them. They seemed too narrow, too simplistic. So I stopped bothering with them.

Maria: Well, we are not writing behavior objectives. We are dividing the curriculum into mini-units and constructing mini-tests. Next year we will be able to show exactly what we have covered and what each student has learned. There is nothing narrow about this; if we want students to know complex relationships, we just say so.

Jim: I wish you luck. Dan Thorpe told me that in the competency-based math at his school, the tests do not accurately represent what the students know. No matter what competencies they would specify, they always ended up teaching and testing for the simpler things, leaving out lots of complex things. It bothers me.

Maria: I'm not worried if the tests do not reflect the complexity of knowledge. Our job is to make sure that <u>every</u> boy and girl has the minimum competencies to continue to the next grade or graduate. They need to know the basics in order to get along in today's world.

* * * * * * * * * * *

Are your feelings more like those of Maria or Jim?

	7-12 Social Studies Supervisors		K-6 Principals		10-12 Math Teachers	
	n	%	n	%	n	%
Maria	40	37	19	30	26	48
Jim	18	4	7	10	13	10
Neither	10	14	6	9	10	8
A little of both	78	45	25	46	44	34
Other	5	1	1	6	1	1

Is the issue "Back to the Basics" important in your community?

"Back to the Basics," continued	7-12 Social Studies Supervisors		K-6 Principals		10-12 Math Teachers	
	n	%	n	%	n	%
Yes, an important issue	117	63	43	72	66	63
No, but it should be	15	15	2	3	17	28
It was, but is no longer	2	1	0	0	1	0
No, not an important issue	13	21	10	23	8	9
Other	0	0	2	2	0	0

As was expected, a majority in each group reported that "Back to the Basics" is an important issue in their communities. Additionally, 28 percent of the mathematics teachers stated that although the issue is not important, it should be.

Almost half of the social science supervisors and elementary prinicpals stated that they have ambivalent feelings - a bit like both Maria and Jim in the scenario situation. A slightly smaller proportion of secondary mathematics teachers indicated ambivalence with 48 percent feeling like Maria. In order to probe further the personal attitudes of the respondents, the following free response item was included.

> What is your own feeling about increasing emphasis on teaching basic skills and knowledge?

The majority of all three respondent groups agreed with the importance of teaching basics, many stating their emphasis should be increased. Several people in each group also commented that they had never stopped emphasizing the basics. In all three groups the need for balance between basics and such things as creativity, progress, critical thinking, reasoning, individualism and flexibility was stressed frequently. In addition, they mentioned that minimal standards should be established for basic skills and knowledge and that these must be met by all students before progressing either to the next grade level or to more complex learning. Judging from their comments, the 10 through 12 mathematics teachers as a group were more likely to interpret "basics" as skills specifically related to their content area, and, given acquisition of the basic tools, students could progress through a sequential learning progress into more complex areas. A few respondents in each group supported increasing emphasis in basic skills and knowledge, particularly at the elementary level.

> Maria is pleased to be dividing the course content into small units and to be specifying competencies in each. Which of the following results do you think will be accomplished more effectively by this approach? (Check as many as you wish)

Effect of molecularization, continued	7-12 Social Studies Supervisors		K-6 Principals		10-12 Math Teachers	
	n	%	n	%	n	%
Setting of priorities and allocating time for instruction	114	67	49	86	69	80
Removing unimportant matters from the curriculum	60	45	14	15	38	57
Raising or maintaining high standards of achievement	48	41	23	53	32	40
Giving teachers more flexibility and freedom	26	29	8	10	6	5
Making courses more relevant to the pupil's experience	45	41	26	31	26	23
Other (please specify)	15	12	1	1	9	7

There was general agreement that Maria's molecularization activities would lead to setting priorities and allocating time for instruction more effectively and, in addition, would raise or maintain high standards of achievement. Social studies supervisors and secondary mathematics teachers disagreed with elementary prinicpals, with a significantly larger proportion of the former indicating that molecularization would result in unimportant matters being removed from the curriculum. Of the three groups, the mathematics teachers were the least optimistic about these activities leading to courses that are more relevant to pupils' experiences.

Some people urge a big push to teach reading skills and math facts alone at first. Other people say you need to teach lots of basic information while teaching the skills. Others say "teach analysis and even interpretation at the same time." What do you say?

	7-12 Social Studies Supervisors		K-6 Principals		10-12 Math Teachers	
	n	%	n	%	n	%
I say "Teach the basic reading and math at first, the other things later."	40	26	21	36	39	57
I say "Teach the basic skills and lots of content first, leave analysis for later."	23	14	12	15	24	17
I say "Teach all those things together, all the time, in every grade."	70	38	22	45	23	20
Other (please specify)	13	22	3	5	7	6

Secondary social studies supervisors disagreed with mathematics teachers in the proper sequencing of teaching skills, the former indicating that analysis and interpretation may be taught along with basic skills (38%) while the majority of the teachers said that basic reading and math should be taught first.

Elementary principals were about equally divided on this question, but all groups disagreed with teaching basic skills and lots of content first with analysis later.

The following item was included to explore the relationship between scientific knowledge and the "basics." All respondents disagreed that scientific knowledge is needed by only a few people, but a majority said that, although science is basic, the 3 R's must be taught first. Although proportions are small, a number of supervisors and principals stated that stressing the 3 R's indicates a lack of understanding of present educational needs.

- Some people think that scientific knowledge is "basic." Why are reading, writing, and arithmetic usually mentioned as "the basics" in elementary education and not science?

	7-12 Social Studies Supervisors		K-6 Principals		10-12 Math Teachers	
	n	%	n	%	n	%
Only a few people really need scientific knowledge	0	0	1	1	0	0
Science is basic but you have to teach the 3 R's first	80	51	31	60	63	71
Science can better be learned outside the elementary school	4	7	0	0	2	1
People who stress the 3 R's do not understand today's needs for education	40	16	13	18	8	4
Other (please specify)	23	26	13	22	18	24

What areas need the most attention at present is the essence of the next five items. The majority of elementary principals and secondary mathematics teachers agreed that teaching of "prerequisite skills" and specification of course objectives are receiving about the right amount of attention while social studies supervisors indicated that more attention should be directed to the first and were equally divided on the second. All tended to agree (approximately 60%) that the right amount of attention is being directed to abstract ideas and concepts. Fewer supervisors (46%), but more principals and mathematics teachers (~75%), responded similarly about emphasis on facts, rules and techniques. On the last item setting minimum proficiency levels, a majority of both the supervisors and teachers stated that more attention is needed. The only response significantly greater than zero indicating less attention is needed was that of social studies supervisors to the need for emphasis on facts, rules and techniques.

A general conclusion might be that principals are saying that things are okay at elementary schools, and, although it would be nice to emphasize everything more, that is not possible. Mathematics teachers say that the high school curriculum is fine except for more emphasis on setting standards and maybe a little more on teaching prerequisites. In contrast, the social studies supervi-

sors are more distressed and want more on prerequisite skills and proficiency levels but less on facts, rules and techniques. Their responses are somewhat perplexing; perhaps they have received criticism for "teaching the facts" in social studies; perhaps they think the facts are sufficiently covered and more attention should be given to other aspects of the curriculum.

Please indicate the attention needed at present in the curriculum in your school:

	7-12 Social Studies Supervisors		K-6 Principals		10-12 Math Teachers	
	n	%	n	%	n	%
Teaching of "prerequisite skills":						
Needs more attention	86	63	18	31	63	41
Amt of attn about right	56	35	37	69	31	59
Needs less attention	3	3	0	0	0	0
Specification of course objective:						
Needs more attention	76	52	21	28	20	16
Amt of attn about right	65	45	33	68	66	79
Needs less attention	7	4	2	4	6	5
Emphasis on abstract concepts, ideas:						
Needs more attention	46	35	17	32	19	29
Amt of attn about right	81	59	34	61	61	62
Needs less attention	16	6	5	6	11	9
Emphasis on facts, rules, techniques:						
Needs more attention	31	30	12	23	36	23
Amt of attn about right	82	46	40	73	53	75
Needs less attention	28	24	3	4	4	2
Setting minimum proficiency levels:						
Needs more attention	89	64	24	41	63	70
Amt of attn about right	53	34	29	52	26	25
Needs less attention	7	2	3	6	3	5

In some communities students are graduating from high school even though they are not capable of reading and doing arithmetic. Why is this happening? Do you think...

	7-12 Social Studies Supervisors		K-6 Principals		10-12 Math Teachers	
	n	%	n	%	n	%
...the teachers are too lax?						
Yes	45	49	17	30	33	20
No	67	40	28	57	46	74
Don't know	16	12	9	13	10	6

Why students are incapable, continued	7-12 Social Studies Supervisors		K-6 Principals		10-12 Math Teachers	
	n	%	n	%	n	%
...the teachers are incompetent?						
Yes	9	7	8	17	9	7
No	96	70	36	67	68	85
Don't know	16	22	9	16	11	8
...Government regulations, laws, and court rulings are making schools promote unqualified students?						
Yes	78	52	23	50	56	77
No	35	41	27	43	17	13
Don't know	21	7	6	7	19	10
...the books they use are inappropriate?						
Yes	25	18	11	21	10	9
No	74	58	34	69	61	77
Don't know	22	25	8	10	18	15
...the schools just push "poor learners" through to get rid of them?						
Yes	78	63	26	53	74	73
No	32	30	26	36	11	24
Don't know	17	8	7	12	5	3

The preceding questions were to assess the reasons for some students graduating from high school with low level basic skills in reading and arithmetic. All agreed that textbooks are adequate and that teachers are competent; however, more supervisors than principals and mathematics teachers said that teachers are lax. External interference as denoted by government regulations and court rulings was viewed as responsible by 77 percent of the mathematics teachers; the other two groups were more evenly divided on this issue although over 50 percent agreed that this is true. A majority of each group indicated that one source of the problem is "poor learners" being pushed through by schools in order to get rid of them. In general, the "inanimate" agents - government and schools - received the blame. This was not true for textbooks although the personal experiences of many of the case study authors and site visitors indicated that some teachers did stress the inadequacy of texts and complained that "their" kids could not handle them.

For a number of reasons students in many classrooms are becoming (as a group) more and more heterogeneous in learning ability and motivation. Is this a major problem for teachers?

	7-12 Social Studies Supervisors		K-6 Principals		10-12 Math Teachers	
	n	%	n	%	n	%
Yes	81	45	24	55	47	50
No	49	20	27	37	28	23
I don't know	20	35	6	8	17	27

Grouping was often viewed as facilitating the teaching process. Slightly more respondents in each group agreed that heterogeneity in learning ability and motivation is a major problem for teachers. When asked to comment on what should be done about this problem, only mathematics teachers were at all emphatic in their support of more homogeneous groupings. Other comments by the three groups included such suggestions as increased inservice and staff development to help teachers deal with the greater heterogeneity within classes, greater emphasis on individualizing instruction, and more support personnel and/or more teachers. In addition, increased attention to development of instructional materials and procedures with varying levels of difficulty to help deal with individual differences and smaller classes were often mentioned. The teachers also suggested enforcing achievement of minimum competencies before promotion to the next level.

Scenario V: Diagnostic Teaching. A major controversy over declining test scores is currently in the news.

> *The "new math" movement, which was extensively promoted during the 1960's, has come under a barrage of criticism and a new movement - "back-to-basics" - has been gaining momentum. People complain that the new math produced a generation of computational cripples who are seriously hindered in their attempts to use mathematics in school and in their daily lives.**

Opponents of the new math programs cite the decline in scores on Scholastic Aptitude Tests (SAT), the Iowa Test of Basic Skills and the Comprehensive Tests of Basic Skills. Proponents argue that the declines were not confined to mathematics and are therefore more indicative of generalized lower academic performance. Furthermore, they point to the first results of the testing by the National Assessment of Educational Progress in which 9 and 13 year-old students performed well in whole number computations but poorly in conceptual areas such as geometry and measurement. Additionally, the 13 year-olds computed nearly as well as did the adult control group and the group of 17 year-old students computed better. All age groups tried to work problems with a one step approach or by using recall. Thus defenders of the new math programs conclude that computational ability is independent of whether people were taught by the new math or traditional methods and that neither method results in learning of important concepts.**

One of the issues found by the case study field workers was the problems that teachers have in teaching mathematical concepts, regardless of whether the new math or traditional programs are used. Closely related to the problems of teaching concepts is the availability of someone with whom teachers may consult when they run into difficulties.

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*Gina Bari Kolata, "Aftermath of the New Math: Its Originators Defend It," Science, 4 March 1977, pp. 854-857.

**Math Fundamentals: Selected Results From the First National Assessment of Mathematics, January 1975, Mathematics Report 04-MA-01.

The scenario developed to evaluate these problems was based upon an actual incident related by a mathematics teacher. This is one of the more specialized scenarios and as such was given to elementary mathematics supervisors and mathematics teachers of grades 7 through 9. Response rates were 116 of 198 (57%) and 81 of 150 (54 %) for these two groups.

* * * * * * * * * *

Please consider this dialogue as a teacher visits a math consultant:

Teacher: I gave 2 + .3 = ? to Tom. He rewrote it on his paper like this: 2 +.3 and wrote down the answer, .5 and said, "point five."

Tom works hard. I believe he likes the individualized math program that we have here in the sixth grade. He has had those problems lots of times. He may not get them right the first time, but he corrects them and is done before the other kids!

I drew three rectangles and asked him to show me what 2 + .3 would be, "using rectangles." He divided one into ten parts, shaded 3 of the parts, then shaded the other two rectangles and said, "The total is two and three tenths."

I pointed back to the .5 and said, "This answer is different. Which is correct?" He said, "Both are correct." I said, "But we started out both times with the same question. How could both answers be correct?" He said, "It depends on the key."

And I guess Tom taught me something when he said, "I'll show you. If I have the problem 2 + .3 = ? and I put down 2 3/10 for my answer, I get it marked wrong. If I have this one (pointing to the rectangles) and I put down .5 I get it wrong. So to get it right, I have to figure out what the key wants."

Mathematics Consultant: This is not uncommon in these individualized programs, but I never heard it expressed with such conviction.

I doubt if you can change his view of the "arbitrariness of scoring-keys" overnight. Lots of kids think math is just a bunch of disconnected rules. Emphasizing "place value," that you can't put 2 and .3 in the same column, seems unrelated to the idea of 3 parts out of 10, 3/10.

What I would look for is the "analog" he has, the incorrect rule that does allow him to put 2 and .3 in the same column. What is his logic? If you find that, you may be able to persuade him that the answer ".5" will always be wrong to this question.

Teacher: Are there some materials I could use to help with this problem?

Mathematics Consultant: I know of some you could try, but you will have to have time to study them carefully yourself. Students see the different formats and conclude that "each is a different kind of arithmetic."

* * * * * * * * * *

Have you found bright students in mathematics classes who are somehow unable to discriminate between significant and insignificant details, bright students who fail to get the "big picture?"

	K-6 Math Supervisors		7-9 Math Teachers	
	n	%	n	%
It is rather common	61	50	32	34
There are a few rare cases	48	50	42	55
I do not know of any such cases	3	1	7	11

Do you find that this type of problem occurs more often with a specific type of instructional method?

	K-6 Math Supervisors		7-9 Math Teachers	
	n	%	n	%
More often with individualized instruction	43	29	23	29
More often with group recitation	14	23	4	6
No difference	45	40	34	50
Other	8	9	10	16

Elementary mathematics supervisors were evenly divided on the prevalence of the problem illustrated in this scenario while a larger proportion of mathematics teachers stated that the problem is less common. Almost 30 percent of each group indicated that the inability to discriminate between significant and insignificant detail is likely to occur with individualized instruction, perhaps because of the independent nature of this method. Larger proportions, 40 percent of supervisors and 50 percent of teachers, stated that these problems are independent of instructional method.

If you were Tom's teacher, how would you deal with this problem of his?

The mathematics teachers' most common approach to Tom's problem was re-teaching or explaining place values, followed by demonstration of the relationship between decimals, fractions and whole numbers. They also mentioned emphasizing the consistency of mathematical laws regardless of the "key." The response most frequently given by mathematics supervisors was to build on Tom's knowledge of fractions by showing their connection with decimals. The second most frequently cited approach was to give practice with real life examples (such as money) to promote understanding of the concept. Other suggestions included individual work with Tom, re-teaching place values, trying to understand his "logic" and modifying teaching methods and materials on that basis and providing more problems to work. Further details on the responses to this question are presented in Chapter 16.

Two questions were asked to assess the kinds of support needed by teachers and kinds of activities that would be helpful if available. Supervisors selected a network of fellow teachers as the most pressing need while teachers were about evenly divided between this option and teacher centers to which teachers can take their problems. A toll-free telephone "hot line" was the only option dismissed by these respondents.

What sorts of support do teachers in your schools need? (Check any number)

	K-6 Math Supervisors		7-9 Math Teachers	
	n	%	n	%
Specialists who come to each classroom perhaps once a month	49	35	26	24
Teacher centers where teachers can take their problems	59	32	39	54
Toll-free telephone numbers teachers can call for help	11	11	8	6
A network of fellow teachers willing to help with diagnosis	67	63	50	49

Which of the following do you believe are of substantial help to teachers having problems teaching basic mathematics? (Check any number)

	K-6 Math Supervisors		7-9 Math Teachers	
	n	%	n	%
University courses in math	17	22	12	14
University courses in math education	41	40	31	41
Staff development featuring presentations by visiting experts	52	24	36	53
Staff development seminars with other teachers talking to a consultant	90	60	40	52
Staff development workshops involving only the teachers	62	53	45	48

Approximately half of the mathematics teachers said that staff development seminars would be useful, whether involving visiting experts, consultants or simply other teachers. Similar proportions of supervisors selected the last two options. Forty percent of each group believed university courses in math education would be helpful but only 22 percent of supervisors and 14 percent of teachers thought the same about university courses in mathematics. Thus it appears that the need is for assistance in methods of teaching mathematical concepts and that both groups are comfortable with the content expertise of mathematics teachers.

As you look at mathematics courses in your school and elsewhere, you probably see things that concern you. Please check those things below that you consider to be major problems. (Check any number)

	K-6 Math Supervisors		7-9 Math Teachers	
	n	%	n	%
Students have been promoted without knowing basic mathematics	67	59	69	92
Too little emphasis given to the "big ideas" of mathematics	40	29	14	14
Too little attention to the "logic" students use to get wrong answers	63	58	32	34
The curriculum under-emphasizes the basic skills	39	31	49	60
The public and administrators are pushing for the wrong things	19	8	15	17
Too little attention is given the individual student as a person	48	20	32	43
Too little help is available to the teacher with teaching problems	62	25	25	19
Class periods are too short, classes too large	23	25	26	26
Textbooks and workbooks for basic math inadequate for older students	16	8	31	27

A number of possible problems exist in mathematics teaching and both groups were asked to designate those things that they felt to be major problems. Over 90 percent of the teachers said that students are being promoted without knowing the basics and a substantial majority (59%) of supervisors agreed. A large number of supervisors also stated that too little attention is given to the "logic" used by students; a similar proportion of teachers said that the curriculum under-emphasizes basic skills. Neither group indicated that the public and administrators are encouraging the wrong things. Only small percentages selected other possible problems, including inadequate textbooks, although over one-fourth of the teachers identified this as a major problem.

Most seventh grade teachers are disappointed with the skills and knowledge children have when they arrive in September, finding them not ready for seventh grade lessons, needing relearning or even new learnings to get ready. And so with the sixth grade teacher, and the fifth, and so on down. Is this not so?

	K-6 Math Supervisors		7-9 Math Teachers	
	n	%	n	%
This is the way it is	94	79	55	69
This is not the way it is	13	16	13	9
I don't know	4	6	10	22

Most teachers assume that it is their responsibility to get children ready for the lessons of subsequent years. Is this not true?

	K-6 Math Supervisors		7-9 Math Teachers	
	n	%	n	%
It is true	88	86	63	88
It is not true	17	9	7	5
I don't know	6	5	7	7

But, examining their own lessons, the projects they assign and the learning experiences their pupils are having, many teachers recognize that they have much broader aims than just getting the youngsters ready for next year's learnings. It distresses them to think of diminishing the broader aims in order to spend more time on the particular skills and knowledge the next teacher may require. Is this not so?

	K-6 Math Supervisors		7-9 Math Teachers	
	n	%	n	%
That is the way it is	65	69	35	43
That is not the way it is	25	22	26	31
I don't know	14	9	17	26

How do you feel? Should most math teachers reconsider the lessons, the projects, and the experiences in their own class toward the purpose of getting youngsters better prepared for the lessons of the next year?

	K-6 Math Supervisors		7-9 Math Teachers	
	n	%	n	%
Yes, definitely	42	62	39	52
No, the broader aims are important too	50	33	26	31
Other	10	5	11	17

The final items on this scenario deal with the kind of preparation students are receiving. Should the primary emphasis be on preparing students for the lessons of the next year or are there broader aims that teachers see as their responsibility? A majority of both groups agreed that teachers are often disappointed in the skills and knowledge of the children who come to their classes and an even greater number, over 85 percent, thought that teachers feel it is their responsibility to prepare children for the next year.

The groups tended to disagree on whether teachers are distressed by having to choose between this focused preparation and broader aims, 69 percent of supervisors as opposed to 43 percent of teachers. However, a majority of both elementary mathematics supervisors and mathematics teachers reported that math teachers should definitely direct their efforts toward preparing youngsters for the next year with slightly less than one-third of each group replying that the broader aims are also important.

Scenario W: Teaching and Socialization. Some teachers and administrators are concerned about keeping children busy and productive. They may select teaching methods and materials that they feel will promote this type of classroom behavior. Some choose to concentrate on drills and worksheets while others use instructional packages and try to encourage learning by the inquiry method. A scenario was developed to evaluate how elementary school teachers and principals of schools with grades 7 through 9 feel about these related topics. Response rates were 47 of 86 (55%) for the principals and 78 of 150 (52 %) for the elementary teachers.

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Please consider this dialogue between two teachers:

Ada James: (cranking the duplicating machine) I don't know what I'd do without the math ditto-masters. They keep everybody busy for the whole period, even John Cohen, who zips through everything in the textbook before I get through explaining it.

Bev Bauer: How do they work? The sheets look pretty simple to me.

Ada James: Well, besides the basic drills, each set includes a few problems that are very difficult, but interesting. Most kids don't get that far. And with these answer cards and the automatic grading machine, I don't get caught having to figure out a problem at the board.

Bev Bauer: Oh, I don't mind that. Someone in the class helps me out. I think it's good for them to see me make a mistake. They know you can't be perfect, and that you have to learn to find the mistake.

Ada James: I made plenty of mistakes when I tried the Inquiry Lessons that Mr. Huang recommended. I didn't mind that as much as the energy it took. It just wore me out. Then it was "textbooks and workbooks" the rest of the day.

Bev Bauer: I know what you mean. For the first time in years we didn't use abacuses this winter. The preparation was just too much. No "hands on" teaching for me this year.

Ada James: Well, I guess I complain about all the work involved, but the real objection is that Inquiry Teaching and projects and science demonstrations let the kids "goof-off." They day-dream or they get off on a tangent or they scuffle. So then I waste more of their time and my time getting them back on the track. I want them to understand that learning is serious business.

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Do you find this concern about keeping pupils busy and productive to be typical of how most teachers feel?

	7-9 Principals		Elementary Teachers	
	n	%	n	%
Yes	26	53	52	59
No, they're not concerned	12	36	15	25
No, they're even more concerned	9	11	8	15
Other			1	1

Do you personally consider it a problem when a boy does not work in class even if he does not bother other pupils and even if he does quite well on tests?

	7-9 Principals		Elementary Teachers	
	n	%	n	%
Yes, it's a problem	28	67	51	65
No, that's not a problem	16	29	18	28
Other	3	4	8	7

Combining responses to the first and third options, a substantial majority of principals of grades 7 through 9 and elementary teachers agreed that most teachers are concerned about keeping students busy and productive, 64 percent and 74 percent respectively. Similar proportions considered it a problem even when well-behaved and achieving students are not busy in class. When asked to compare the importance of considerate and respectful behavior in class to understanding subject matter in an open-ended question, (below) over 80 percent of both teachers and principals responded that behavior is of equal or greater importance than content. A slightly lower proportion of principals said that it is more important, 29 percent as compared to 42 percent of the teachers. Not a single comment was made to the effect that behavior is not important or that it is not a teacher function to develop consideration and respect in youngsters.

Please tell how important it is in your school for teachers to insist that youngsters be considerate of others, to show respect to adults, and to follow directions carefully in doing assignments? Would you say it is more important or less important than requiring that pupils understand the subject matter content in their science lesson?

Open-ended responses	7-9 Principals		Elementary Teachers	
	n	%	n	%
Important, more than content	16	29	30	42
Important, less than content	2	1	5	4
Equal importance	26	53	28	42
Other	2	16	14	13

One teacher said, "If you watch how teachers react in the classroom, you will see them deal first with the belligerent, then with those whose spirits bubble over, then with those who have withdrawn, and only then, with those who are quietly busy but confused." In other words keeping order and getting work started regularly take precedence over improving the quality of the work children are doing. Do you believe that most teachers feel this way?

Open-ended responses	7-9 Principals		Elementary Teachers	
	n	%	n	%
Yes	19	41	27	39
No	13	47	25	34
Some but not most	3	5	8	10
They may not feel this way but they function this way	3	4	1	1
Other	3	2	12	17

Opinion was quite diverse in response to the above open-ended question on the priority order with which teachers deal with children's problems. A surprisingly large number, approximately 40 percent of both groups, said that most teachers agree with the above statement; a slightly larger proportion of principals and an even smaller proportion of teachers disagreed.

Can social responsibility and social studies be taught at the same time or do they each need pretty much their own time?

	7-9 Principals		Elementary Teachers	
	n	%	n	%
Can teach both at same time	42	94	71	93
Each needs its own time	2	3	6	5
Other	3	3	1	2

There was overwhelming consensus within each of these two respondent groups that social responsibility and social studies are compatible and may be taught at the same time. It is interesting to note that the programming of social studies by various educators almost always attends to the skill and content components and leaves the task of teaching social responsibility to the teacher.

Do you agree with Bev Bauer that it is good for pupils to see teacher mistakes?

	7-9 Principals		Elementary Teachers	
	n	%	n	%
Very definitely	37	90	57	80
No, it is distracting	5	5	4	4
Other	5	5	13	16

What do you believe regarding errors made by teachers, materials and pupils?

	7-9 Principals		Elementary Teachers	
	n	%	n	%
Errors usually should be corrected immediately and authoritatively	8	13	14	18
Usually pupils should be allowed to discover errors; encouraged to discuss them	30	66	48	61
Other	9	21	16	21

Related to the philosophy of discovery or inquiry method of teaching and learning, principals and elementary teachers were asked about making mistakes. Substantial majorities of both groups indicated that it is very good for students to see their teachers make mistakes. Furthermore, there was general agreement, over 60 percent in each group, that students should be allowed to discover errors, whether made by the teacher, themselves or other students or in written materials.

Three additional items were posed to evaluate opinion on the inquiry method, defined as "lessons in which students design and carry out their own investigation." Of the principals, 73 percent reported that less than 25 percent of instruction time is spent on the inquiry method by the average teacher; 54 percent of the elementary teachers agreed. There was a slight tendency for elementary teachers to indicate a higher proportion of time devoted to the inquiry method, but we cannot be sure whether this is due to differences in perceptions between the two groups or because the principals are primarily relating to grades 7 through 9.

Please estimate the percentage of instruction time the average teacher in your school spends in "inquiry teaching," that is, lessons in which students design and carry out their own investigation.

Time spent on inquiry method, continued	7-9 Principals		Elementary Teachers	
	n	%	n	%
Less than 10%	16	18	34	40
10% to 25%	19	55	12	14
25% to 50%	7	10	10	11
More than 50%	2	1	5	12
I don't know	3	16	17	23

Why isn't more time spent in "inquiring teaching" (as defined above)?

	7-9 Principals	Elementary Teachers
	n	n
It is too hard to ask students enough of the right questions	6	12
Students are too likely to "goof-off"	8	18
The necessary equipment and supplies are too difficult to provide	15	32
Most students cannot really carry out inquiries effectively	15	33
Inquiry gives pupils the false impression about what learning is	1	0
Other	15	10

Unfortunately, respondents selected more than one option to the above item and a post hoc analysis on just the actual frequencies of responses is reported. The two most commonly checked reasons by both groups as to why more time is not spent in "inquiry teaching" were that the necessary equipment and supplies are too difficult to provide and that most students cannot really carry out inquiries effectively. Only one principal and no teachers said that inquiry gives pupils the false impression about what learning is.

Is it correct to say that teachers concerned about "getting instruction to happen" usually <u>like</u> "packaged" individualized instruction, such as IPI or Project Plan; but teachers concerned about the subject-matter learned usually <u>do not like</u> such packaged instruction?

	7-9 Principals		Elementary Teachers	
	n	%	n	%
That is correct	18	64	18	22
This is wrong	9	19	10	12
I don't know	17	16	47	65
Other	1	1	1	1

While the majority of principals agreed with the preceding statement that teachers concerned with subject matter generally do not like "package" individualized instruction, a similar percentage of the elementary teachers indicated that they do not know whether or not this is the case. Finally, both groups were asked to comment on the following opinion.

> Please comment on the following opinion. "Among teachers there is not a general acceptance of technology. Worksheet duplication is seldom done by photocopy. Hand-held calculators are owned by many children, but are seen by most teachers as obstacles to learning arithmetic. Instructional television and computer-aided instruction are seldom considered as potentially integral to the school program. The largest barrier is cost, but the profession is generally opposed to technological change." Right or wrong? Please comment:

The majority of both the principal and teacher respondent groups disagreed with this statement: 26 of the 47 principals and 40 of the 78 elementary teachers (16 principals and 30 teachers agreed). They stated that some teachers are opposed to change, but many stated that cost was the major obstacle to trying and accepting new technological developments. There was some indication that training for teachers in the use of technological developments would be helpful.

Scenario X: Teacher Support Systems. The topic of short-term retention of information is used to motivate a discussion of the kinds of opportunities teachers have to obtain help with pedagogic problems. It was our desire to investigate thoroughly the support mechanisms available to teachers, to solicit opinion on which ones are useful, and to ask what assistance they need with this and other teaching problems. The scenario depicting this situation was administered to secondary mathematics supervisors of grades 7 through 12 and science teachers of grades 7 through 9. Of the supervisors 132 of 211 (63%) responded as did 93 of 150 (62%) science teachers.

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Please consider this situation:

Teachers at Cyrus Knight Junior High School have more than a few puzzlements about persisting instructional problems. They do not have much time to think about them. Each teacher does have some free moments--but then it seems there is no one to talk about it to. The conversation in the teachers' lounge is usually about social things--movies, sports. camping trips, and school politics. The principal is always willing to help, if it's an organization or scheduling problem, but has little more than a sympathetic ear for something like the "forgetting problem."

Teachers aren't surprised that youngsters forget their lunch money or that they forget the name of the prime minister of Canada. But they cannot understand how children who last month completely knew how to divide 404.13 by 37, or who knew exactly the three requirements for combustion, now cannot even come up with a partial answer.

There is an "inservice program." Almost every month district resource persons of some kind come after school to give a demonstration or to get a discussion going, but the real problems of teaching seem to be a mystery to them too. Inservice people bring plans for keeping student-performance check-lists or new procedures for organizing laboratory projects, but not much on pedagogic problem-solving.

About half the teachers are enrolled in an evening or summer school course. Once in a while they have an opportunity to bring up something like the forgetting problem. It becomes apparent that it is a common problem with others in the course. The instructor may help to analyze the problem, speaking perhaps of "identical elements" and "retroactive inhibition." But it is not much help.

There may be no answers to problems like these. For the teachers at Cyrus Knight, there are few opportunities to find out. They have less than a half dozen chances a year to explore such problems. There is even some expectation that most of the time such problems should not be talked about.

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How similar is this picture to the situation in the junior high school(s) or middle school(s) in your district?

	7-12 Math Supervisors		7-9 Science Teachers	
	n	%	n	%
Quite similar	63	51	56	60
Not very similar at all	39	39	24	27
Other	15	10	13	14

In your opinion are middle schools or junior high schools better organized to help teachers with such problems?

	7-12 Math Supervisors		7-9 Science Teachers	
	n	%	n	%
Middle schools	24	13	14	19
Junior high schools	13	7	6	10
No difference	43	53	29	23
Don't know	43	27	42	47

Over 50 percent of both secondary mathematics supervisors and middle/junior high school science teachers agreed that the situation depicted in the scenario is similar to that at their own schools. Medium-sized proportions, however, said that this situation is not like their own. When queried on whether middle or junior high schols could best cope with these kinds of problems, of those in both groups who saw a difference, there was a slight indication that middle schools are better organized to deal with such problems.

What in this description of Cyrus Knight School is particularly relevant to the schools in which you work?

Response trends among both secondary mathematics supervisors and science teachers of grades 7 through 9 were similar. The most commonly mentioned point of relevance was lack of time to think about or discuss problems. The next two aspects most frequently noted were that the forgetting problem is a real one and that inservice programs do not deal with or solve such problems. Other responses were that nothing and all or almost all of the description was relevant to their own situations, an almost equal split. The final substantial response was a comment that the lounge converstaion sounded familiar.

What important differences are there between your situation and that of the Cyrus Knight School?

The responses here differed somewhat between the two respondent groups. The major difference mentioned by supervisors was that their schools do not have good inservice programs while none of the teachers mentioned this. In fact, the teachers' third most frequent response was that they have either no inservice program or a very limited one. The supervisors also said that teachers do have time and opportunity to discuss and work on such problems; they do not have resource persons visiting regularly; the principal is responsive to such problems; and teachers are involved in suggesting and planning inservice programs. No difference between situations was their fourth most frequent response. The difference most commonly mentioned by teachers was that they have or make time to discuss and plan with one another to deal with such problems at their schools. Almost as frequent was the comment that there was no difference, followed by the previously mentioned comment regarding the lack of inservice programs. They also said that their principals are responsive to such problems and they do not have resource persons available or visiting regularly.

By and large, how would you describe the climate for solving pedagogic problems in schools where you work?

	7-12 Math Supervisors		7-9 Science Teachers	
	n	%	n	%
The climate is good	88	77	47	50
Conditions prevent a good climate	34	20	28	29
Nobody cares	3	1	15	21
Other	4	1	0	0

Would you say that teachers are able to take good advantage of the experience of other teachers for solving their own teaching problems?

Teachers assisting each other, continued	7-12 Math Supervisors		7-9 Science Teachers	
	n	%	n	%
Yes	80	65	60	63
No	37	23	24	26
I don't know	6	7	9	11
Other	8	5	0	0

Substantially more supervisors than teachers stated that the climate at their school(s) is good for solving pedagogic problems, 77 as opposed to 50 percent. Perhaps of even greater concern is the fact that 21 percent of the science teachers, a proportion significantly greater than zero, said that nobody cares. Both groups agreed quite closely, however, that teachers are able to help one another with such problems. The small number who answered "no" to this last question were asked to indicate why they are unable to do so; most gave more than one reason and only raw frequencies are presented. The most popular reasons were a lack of time to work on such things, little reward to teachers for helping each other and talking about such problems is threatening and an admission of weakness.

If you answered "no" why do you feel that they are unable to do so?

	7-12 Math Supervisors	7-9 Science Teachers
	n	n
Teaching problems are idiosyncratic, the same solution doesn't work elsewhere	10	7
Talking about teacher problems is threatening, an admission of weakness	20	8
There is no time to work on these things	26	14
The emphasis on teacher assessment discourages discussion of problems	5	3
Little reward is given to teachers for helping each other	21	11
Other	2	1

In training and selecting principals do you believe that too much emphasis has been placed on their ability to organize and administer the school program and not enough on understanding pedagogic problems?

	7-12 Math Supervisors		7-9 Science Teachers	
	n	%	n	%
Yes	70	40	50	47
No	24	42	17	12
I don't know	32	18	26	41
Other	2	0		

A sizable proportion of both mathematics supervisors and science teachers, 40 and 47 percent respectively, responded that principals have been trained or selected on the basis of administrative as opposed to educational skills. However, a smaller proportion of supervisors said this is not true while a significantly lower proportion of teachers, only 12 percent, selected this response.

What is your feeling about summer institutes such as NSF has sponsored? (These are institutes involving fulltime enrollment in special sections of college math or science courses, with some help from educational professors.) Check one or more.

	7-12 Math Supervisors		7-9 Science Teachers	
	n	%	n	%
They do a good job of giving ideas, contacts, and confidence	86	54	49	53
They are good for good teachers, not very helpful for teachers really needing help	25	25	10	15
They are not as valuable as institutes run by experienced teachers	18	13	9	9
There should be more of them so that all teachers needing them could enroll	66	37	42	52
Other	25	12	25	24

A slight majority of both groups indicated that the NSF summer institutes are useful in providing teachers with ideas, contacts and confidence. Additionally, a similar proportion of science teachers said that there should be more institutes. They apparently feel that these activities are more useful than institutes run by experienced teachers. Under "other" both groups commented that they do not know what NSF institutes are like. Several other comments and suggestions were made, each mentioned only once. Some of the teachers did mention that they had attended such institutes and found them very helpful, great, "the most fantastic experience and help I've had as a teacher."

One Cyrus Knight teacher said, "Schools and universities are headed in different directions. Schools want more and more to teach what parents and students believe is useful. Universities want to stress theoretical ideas, the search for Truth." Is this a problem?

	7-12 Math Supervisors		7-9 Science Teachers	
	n	%	n	%
No	36	18	35	30
It causes some problems, but that is just the way things are	24	27	14	29

Directions of schools and universities, continued	7-12 Math Supervisors		7-9 Science Teachers	
	n	%	n	%
Yes, a problem, mainly because schools no longer see what education is	15	29	11	12
Yes, a problem, mainly because universities just are not interested in people	9	9	9	13
Other	44	17	23	16

Both supervisors and teacher groups were fairly evenly distributed in their response to the potential conflict between the educational goals of schools and universities. Other comments included a real variety of opinion. While a few teacher and supervisor respondents agreed that schools and universities are headed in different directions, they said the curriculum should respond to both. Some people disagreed with the statement. Several comments from both groups indicated a feeling the universities are out of touch with the schools and with practical aspects of teaching.

What could universities do to be of most help to teachers? (Check only one)

	7-12 Math Supervisors		7-9 Science Teachers	
	n	%	n	%
Develop curricula more appropriate to the times	21	23	26	43
Run inservice workshops and institutes	27	13	16	16
Offer courses oriented to teacher needs	26	27	15	12
Establish teacher centers	4	0	5	3
Sponsor teacher networks for mutual help	6	3	6	6
Other	44	33	23	20

When asked what universities could do to help teachers, the largest proportion of science teachers selected the development of more timely curricula. Approximately one-fourth of the supervisors selected this option along with offering courses oriented to teacher needs. There was negligible support from either group to establish teacher centers or sponsor teacher networks for mutual help. It is impossible to know whether the low response to these suggestions is because they are truly unattractive or if, perhaps, the idea of such centers and networks is too abstract. Under other suggestions, comments included very little from the teachers other than offering courses dealing with the actual classroom situation, methods and discipline. Supervisors suggested these as well as courses in reading, math, science and social studies; identifying and meeting the needs of individuals within the classroom and working with underachievers and "reluctant learners." The few other comments were scattered except for a small cluster around improved teacher training with more stress on the subject matter and education faculty spending time in K through 12 classrooms.

Finally, respondents to this scenario were asked to respond to an open ended question asking what they feel is most needed to improve opportunities for teachers to get help with pedagogic problems in their classroom. Many suggestions were made by both groups with four major areas of possible improvement. The first was more time (and support for time) devoted to planning and preparation and sharing ideas with other teachers. The second major recommendation was for constructive supervision by experienced, master teachers and the opportunity for consultation with such people; for workshops and inservice programs cooperatively planned by university, central office and school staffs with a goal of solving such pedagogical problems. A third emphasis included improved teacher training that is more relevant to actual situations, longer internships or experiences in schools, and maintaining high standards for certification. The final major suggestion was that there be more communication between administrators and teachers leading to greater understanding and support from the administrators; greater understanding and support from parents and the public were seen also as desirable.

Scenario Y: Personal Bias in Teaching. The National Science Foundation has been explicit in including social studies or sciences along with mathematics and science in its definition of science education. This definition provided the opportunity to investigate two issues that are of special interest in the social sciences. First, it was desirable to investigate how the scientific method of inquiry is perceived as applied to social studies and the prevalence of its use. Second, perhaps more than the other two disciplines, social studies include topics of potential controversy and possibly are more prone to contamination by personal bias.

A conversation between the teacher and students in a American history classroom is the setting for this scenario. Four groups were asked to respond to the scenario: social studies teachers in grades 7 through 9, social studies teachers in grades 10 through 12, high school seniors and parents of high school seniors. Response rates were 42 of 75 (56%) of grades 7 through 9 teachers, 41 of 75 (55%) of grades 10 through 12 teachers, 361 students and 148 of approximately 250 (~59%) parents. The possibility of combining the two groups of social studies teachers was considered. However, their responses were quite consistent except for slight differences on two items and it was felt that demonstration of this consistency to the reader was worthwhile. Thus the two groups have been analyzed separately, in spite of the small individual sample sizes.

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Please consider the following situation:

At Metro High School, Mr. Robinson's American History class is studying immigration and the settlement of America, noting particularly how immigrants have influenced the growth of their city. Here is dialogue midway through Monday's class:

Mr. Robinson: After the Irish immigration of the 1840's and after the importation of Chinese laborers, what other waves of immigration occurred? Sally?

Sally: Europeans around 1890 and then again after World War I.

Mr. Robinson: Good. I guess that's when we got our Polish jokes, right? (no one laughs) Well, let's see. What sort of long-time trend are we studying?

Sherman: People coming to America.

Mr. Robinson: Why did they come, Tammie?

Tammie: To come to a country with freedom.

Doug: (sarcastically) Like freedom to pick cotton.

Mr. Robinson: Well, let's think about that. Some of the early colonists were seeking freedom. Were the Chinese who came after the Civil War seeking freedom? (no answer) What were they looking for? (no answer) What were the Irish looking for?

Wendy: Food!

Mr. Robinson: Food more than freedom? Let's make a list of possible reasons for immigrating, then consider each one.

Eric: My dad says we should be studying how to send them back where they came from rather than how they got here.

Mr. Robinson: Okay, that's an idea. After we make our list of reasons for immigration, let's figure out who wanted the immigrants here and who didn't want them. And then let's decide whether I should be sent back to Africa or Europe.

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Mr. Robinson is asking questions about history and joking about it. What is your reaction to his teaching style?

	7-9 Soc Stud Teachers		10-12 Soc Stud Teachers		Students		Parents	
	n	%	n	%	n	%	n	%
It is fine for some teachers to teach this way. It gets their attention	27	51	22	54	186	61 (52)	87	41 (60)
I find it offensive	3	22	3	16	26	9 (7)	20	19 (14)
I don't mind, but he is not likely to get the job done	5	16	7	12	70	18 (19)	27	28 (19)
Other (fine in principle but not in this case)	7	12	1	2	71	11 (20)	11	12 (8)
Other (please indicate)	0	0	8	16	7	1 (2)	1	0 (1)

A majority of all the groups except parents agreed that the approach used by the teacher in this scenario is acceptable; this latter group had the highest proportion saying that, although acceptable, the approach is likely to be ineffective. Many of the comments made under the "Other" category stated that this approach is fine in principle, but not in this particular illustration; thus this category was added in reporting responses on this item.

Do teachers and students talk like this in your school(s)?

	7-9 Soc Stud Teachers		10-12 Soc Stud Teachers		Students		Parents	
	n	%	n	%	n	%	n	%
Yes, lots do	8	11	9	31	55	14 (15)	34	21 (24)
Yes, a few do	26	55	24	46	261	56 (72)	83	32 (59)
No	6	28	7	22	44	30 (12)	14	43 (10)
Other	2	6	1	1	1	0 (0)	10	3 (7)

Over half of all groups reported that teachers and students interact in this manner in their school(s), the highest being 77 percent of the high school social studies teachers. A slightly higher proportion of parents did not agree that this somewhat breezy approach to teaching social studies occurs in their schools.

Mr. Robinson seems reluctant to accept the idea that most immigrants came to America seeking freedom. Let us suppose that this is a bias of his. How important is it for social studies teachers to keep their biases to themselves?

	7-9 Soc Stud Teachers		10-12 Soc Stud Teachers		Students		Parents	
	n	%	n	%	n	%	n	%
They should recognize their biases and keep them to themselves	9	15	5	16	44	11 (12)	40	24 (27)
They should speak honestly as to how they feel on matters	1	2	1	2	31	7 (9)	6	1 (4)
They should tell how they feel, but present alternative views too	26	72	25	59	254	78 (71)	94	72 (64)
Other	6	1	10	23	30	4 (8)	6	3 (4)

Suppose Mr. Robinson was leading up to a critical analysis of the free enterprise system. Suppose he intended to say that the system was dishonest, that it was cruel in the way it imported cheap labor from foreign lands to work in this country. Do you feel that it would be inappropriate for Mr. Robinson to acquaint the students with his conclusions about the free enterprise system in early America?

	7-9 Soc Stud Teachers		10-12 Soc Stud Teachers		Students		Parents	
	n	%	n	%	n	%	n	%
It would be right, in fact it is his responsibility to be frank	6	9	1	1	55	15 (16)	32	11 (22)
It would be all right as long as he indicated his value-orientation	24	61	30	75	165	41 (47)	72	46 (49)
It is ethically proper, but he would be foolish to do so	3	6	0	0	16	8 (5)	6	14 (4)
It is wrong for him to use his position for teaching those things	6	16	3	5	65	19 (18)	28	23 (19)
Other (please explain)	3	8	7	20	53	17 (15)	9	5 (6)

The previous two items deal with bias or personal opinion of the teacher and asked respondents how this should be handled in the classroom. A majority of all groups agreed that teachers should speak honestly but also present alternate views. Students were in strongest agreement, 85 percent; over 70 percent of parents and social studies teachers of grades 7 through 9 agreed while slightly less, 61 percent, of those teaching grades 10 through 12 concurred.

On the second item, a similar proportion of 7 through 9 teachers agreed that it would be right for Mr. Robinson to be frank or indicate his value-orientation. The proportion of teachers of grades 10 through 12 increased to 76 percent in their approval of this approach while proportions dropped for parents and students, a drop of 27 percentage points for the latter. Thus, in spite of the slight shifts in approval between the responses to the two items, we may conclude that a majority of these groups agreed that teachers should be frank and present their own views on controversial topics. Yet the case study field workers found teachers frank but seldom dealing with controversial issues, and then usually to present only the prevalent views of the community.

Some parents believe that certain topics should be left out of science and social studies courses, topics such as evolution of the species, human reproduction, and family attitudes and customs. Some parents want such things taught, and of course, want them taught well. --- We need to find out how you feel about using Federal Funds for development of teaching materials that include such controversial topics.

	7-9 Soc Stud Teachers		10-12 Soc Stud Teachers		Students		Parents	
	n	%	n	%	n	%	n	%
Federal funds should never be spent on such development	5	13	3	9	18	21 (5)	35	33 (24)
It is all right to spend federal funds this way if it will not cause trouble	4	7	7	10	98	22 (28)	27	12 (18)
It is important to provide federal support for such development	25	58	20	59	196	46 (55)	63	29 (43)
Other	8	21	10	22	42	11 (12)	22	27 (15)

The above item was designed to assess how respondents feel about the use of federal monies to support the development of potentially controversial subject matter. A majority of social studies teachers in both groups as well as students tended to approve the use of federal funds for this purpose while quite small proportions, none significantly greater than zero, said such funds should never be used to develop teaching materials on controversial subjects. Parents, on the other hand, were more undecided about the use of federal funds for this purpose. Twenty-nine percent indicated it is important while 33 percent disagreed with this use of federal monies; both proportions are significantly greater than zero.

In what ways have budget cuts in your district seriously affected the social studies curriculum? (Check one or more)

	7-9 Soc Stud Teachers		10-12 Soc Stud Teachers		Students		Parents	
	n	%	n	%	n	%	n	%
We have not had budget cuts recently	11	42	10	29	67	23 (19)	34	20 (23)
The social studies curriculum has not been seriously affected in any way	10	14	12	24	105	26 (29)	41	22 (28)
Classes have been larger in size	15	31	12	30	76	14 (21)	29	20 (20)

Effects of budget cuts, continued	7-9 Soc Stud Teachers		10-12 Soc Stud Teachers		Students		Parents	
	n	%	n	%	n	%	n	%
Needed and highly qualified teachers have been "let go" and not replaced	2	3	5	11	36	7 (10)	17	19 (12)
We have more teaching from textbooks, less with materials or in the field	14	27	10	22	107	27 (30)	29	31 (20)
No longer can we provide a textbook for each student individually	5	14	3	6	27	9 (8)	7	2 (5)
The inservice training program has been cut back substantially	4	7	5	14	12	2 (3)	2	1 (1)
Other (please indicate)	6	12	3	5	32	11 (9)	18	6 (12)

Overall, approximately one-fourth of the respondents reported that they have not had recent budget cuts in their district and a slightly smaller proportion stated that, if one has occurred, it has not seriously affected the social studies curriculum. Over 30 percent of the teachers, however, said that classes have been made larger. Approximately one-fourth of each group indicated there is more textbook teaching and less work with materials or in the field. The other options were selected by only small proportions of any respondent group.

The final item in this scenario asked these people to indicate any major problems with the social studies courses. No option was selected by a majority of any group, perhaps indicating a general satisfaction with the social studies curriculum. Not enough qualified teachers was noted by 47 percent of the parents but by smaller proportions of the teachers themselves. There was some agreement, except among parents, that courses emphasize facts too much and concepts not enough. Small but very consistent proportions indicated a desire for more emphasis on the teaching about personal values.

As you look at social studies courses in your high school and elsewhere, you probably see things that concern you. Please check those things that you consider to be major problems. (Check as many as you wish)

	7-9 Soc Stud Teachers		10-12 Soc Stud Teachers		Students		Parents	
	n	%	n	%	n	%	n	%
Too much emphasis on facts, not enough on concepts	18	36	13	27	168	40 (47)	32	14 (22)

Problems with social studies, continued	7-9 Soc Stud Teachers		10-12 Soc Stud Teachers		Students		Parents	
	n	%	n	%	n	%	n	%
Too much emphasis on concepts, not enough on facts	8	16	11	26	47	13 (13)	33	39 (22)
Too much emphasis on teaching about personal values	4	8	2	4	43	8 (12)	14	5 (10)
Not enough emphasis on teaching about personal values	12	24	13	27	122	35 (34)	49	36 (33)
Not enough qualified teachers	7	16	5	21	75	23 (21)	48	47 (32)
Belief that teachers teaching the same course should teach the same things	9	17	10	16	104	17 (29)	22	16 (15)

Scenario Z: Elitism in Science. Science courses have frequently been thought of as courses for the "brighter" students, especially such courses as chemistry, physics and the advanced mathematics courses. Of course, all students must take some basic courses such as general science and/or biology, general math or some equivalent. There is an attempt by many teachers to make science relevant and a realization that science knowledge is required to live in today's society, but there is still evidence of the old "elitism" regarding advanced courses. A scenario depicting a conversation among students was developed to gather reactions from high school counselors, science teachers of grades 10 through 12 and senior students in order to determine the prevalence of these ideas. Response rates were 46 of 87 (53%) 101 of 150 (67%) and 375 students.

Four ninth grade biology students waiting for the afternoon bus:

Ann: Sure it would be fun to be doing something, but lots of kids don't want to dissect frogs.

John: Ridiculous!

Laurie: I can't stand killing insects and pinching them to a board.

Tania: Next week we're going to watch plants grow. What do we do while we wait?

Laurie: Probably bookwork.

Tania: More hassles! There's not enough time to study at school. And they won't let you check the books out, so I can't study at home. So I flunk. Biology is too hard. It should be at the tenth grade.

John: There should be better "filtration." Not everybody should be allowed in the course. If you're going to take biology you gotta be willing to work.

Ann: That's what Mr. Mueller says. He says when we get to physics we will really have a good class because only the best students will be there.

Tania: But that's why it's so hard. My courses are too hard already. The kids who don't want to study have already gone into Art and Psychology.

John: Dumbhead courses!

Laurie: In seventh grade all the kids are mixed together in a big group, and then it splits--like that "mitosis" stuff, y' know.

Tania: Well, I want to be an obstetrician. I'd like to study birth and everything and sex education. You know, films and that sort of thing. Just reading from a book you don't get enough information. They use all those humungus words, all that Latin! Yuk!

* * * * * * * * * * *

Are the feelings expressed here typical of opinions held by students in your first-year biology classes?

	Counselors		10-12 Science Teachers		Students	
	n	%	n	%	n	%
Yes	18	60 (43)	59	61	231	61 (65)
No	20	37 (48)	29	37	126	39 (35)
Other	3	4 (10)	5	2	0	0

Approximately 60 percent of each group agreed that the feelings expressed by the students in the scenario are representative of first-year biology pupils. Slightly over 35 percent disagreed. When asked why they disagreed, all three groups of respondents commented that students have a more positive attitude, both in general and toward science courses, and that students are not all afraid of hard courses. It was also noted that biology is not always taught in the ninth grade. Students also mentioned that art and, especially, psychology are not viewed as "dumbhead courses" and that books are not as inaccessible as depicted in the above conversation.

What do you think is the principal cause of student dissatisfaction such as this? (Check one)

	Counselors		10-12 Science Teachers		Students	
	n	%	n	%	n	%
Boring lessons	5	10 (13)	5	6	83	24 (31)
Insensitive teachers	5	5 (13)	6	5	8	1 (3)
Incompetent teachers	5	6 (13)	2	5	16	3 (6)
Their own immaturity	11	45 (28)	24	32	49	23 (19)
Subject matter is irrelevant to student lives	8	23 (21)	12	15	55	28 (21)

Causes of student dissatisfaction, continued	10-12 Science Counselors n	%	Teachers n	%	Students n	%
Unrealistic assignments	2	7 (5)	3	3	17	4 (6)
Inadequate textbooks	0	0	0	0	8	3 (3)
Inadequate lab equipment and supplies	3	4 (7)	2	2	13	10 (5)
It's just talk, they aren't really distressed	0	0	7	32	15	3 (6)
No comment	7	0	40	0	111	0

When asked the principal cause of student dissatisfaction with science courses; over 60 percent of the counselors said it is due to student immaturity on the irrelevance of the subject matter. High school science teachers, on the other hand, tended to select student immaturity and the belief that students are not really distressed - that it is just talk, although the latter reaction is based upon a small number of respondents. One-fourth of the students themselves said they are dissatisfied because the lessons are boring and the subject matter is irrelevant, and a similar proportion indicated it is due to their own immaturity.

An open ended question asked those people if there are some important changes that could be made in science courses so that such students would like them more and get more out of them, and, if so, what changes. The suggestion mentioned most frequently by all three groups was that courses should be made more practical and relevant. The next most frequent recommendation was to have more lab experience and activity, cutting down on bookwork. Better teaching, a greater variety of elective course offerings, smaller classes and more individual attention along with more improved materials and up-to-date textbooks were mentioned by all three groups. Students further stressed the importance of the teacher in stimulating interest and learning. Several also suggested making science courses more interesting without any specific criteria or guidelines for doing so.

Are science courses in your school too difficult?

	10-12 Science Counselors n	%	Teachers n	%	Students n	%
Yes	7	11 (15)	9	9	47	12 (13)
No	33	84 (72)	87	88	272	81 (73)
Other	6	5 (13)	3	3	53	7 (14)

In science courses in your school, is the balance between lab or project and textbook work about right?

Balance between lab and bookwork, continued	10-12 Science Counselors n	%	Teachers n	%	Students n	%
Yes	23	25 (50)	65	69	205	69 (56)
No, we need more lab work and projects	22	74 (48)	34	30	153	29 (41)
No, we need more textbook work	0	0 (2)	0	0	11	1 (3)

Do you feel your school should be offering more science courses designed for the "below average" student?

	10-12 Science Counselors n	%	Teachers n	%	Students n	%
Yes	20	43 (47)	50	44	167	26 (45)
No	22	54 (51)	46	52	125	46 (34)
I don't know	1	1 (2)	4	3	80	28 (22)

Is it more difficult for students to get good grades in science than in most other subjects in your school?

	10-12 Science Counselors n	%	Teachers n	%	Students n	%
Yes	17	31 (37)	36	33	140	35 (38)
No	28	68 (61)	51	43	167	47 (45)
I don't know	1	1 (2)	12	18	64	17 (17)

The above four items asked about science in the respondent's own school. Overwhelming majorities of all groups stated that science courses are not too difficult and almost 70 percent of teachers and students said the balance between lab or project and textbook work is acceptable. Surprisingly, a large proportion of counselors (even disregarding the weighted percentages) disagreed with teachers and students on this latter question with three-fourths saying more lab and project work is needed. No counselors or teachers and a negligible number of students indicated a need for more textbook work.

Counselors and teachers were about evenly split between whether or not more science courses should be offered for "below average" students; only one-fourth of the students agreed that this should be the case. On the subject of the ease with which students can get good grades in science, approximately one-third of each group responded "yes." Slightly larger proportions of teachers and students, 47 percent, disagreed that it is more difficult to get good grades in science as opposed to other courses. However, many more counselors (68%) stated that this was true at their school.

Do you believe that a major effort should be made to raise the "scientific literacy" of young adults?

	Counselors		10-12 Science Teachers		Students	
	n	%	n	%	n	%
Yes	35	87 (76)	97	96	228	57 (61)
No	5	5 (11)	4	5	68	10 (18)
I don't know	5	6 (11)	0	0	75	33 (20)
Other	1	2 (2)	0	0	1	0 (0)

Should school districts set some minimum competency in science for all students to obtain in order to graduate from high school?

	Counselors		10-12 Science Teachers		Students	
	n	%	n	%	n	%
Yes	28	46 (61)	70	71	189	49 (51)
No	11	46 (24)	16	20	137	39 (37)
I don't know	5	7 (11)	15	9	45	13 (12)
Other	2	2 (4)	0	0	1	0 (0)

Are junior and senior science courses in your school aimed primarily at the students who will be going to college?

	Counselors		10-12 Science Teachers		Students	
	n	%	n	%	n	%
Yes	34	76 (74)	72	78	273	73 (73)
No	9	21 (20)	27	18	54	11 (15)
I don't know	0	0 (0)	1	3	45	16 (12)
Other	3	3 (7)	1	1	1	0 (0)

Three items were designed to obtain opinion regarding some current issues in science education. Almost all teachers and 87 percent of the counselors stated that there should be a major effort to increase "scientific literacy" among youngsters. Over half of the students agreed, but one-third said they do not know; perhaps they do not know what is meant by this phrase. On the question of minimum competency in science as a pre-requisite for high school graduation, 71 percent of the high school science teachers supported this proposal. Counselors and students were more evenly divided on the question. This identical item was included on one of the versions of the questionnaire fourth page. In response to that question, 67 percent of a combined teacher group agreed, as did 46 percent of the students, indicating consistency in the response to this proposal. Finally, there was general agreement among the three groups, over 70 percent in each case, that junior and senior level science courses are primarily designed for students who will attend college.

Do science teachers in your school seem to want mostly to teach "pure" science rather than about how science is used in everyday life?

	Counselors		10-12 Science Teachers		Students	
	n	%	n	%	n	%
Yes	17	22 (38)	34	29	179	43 (48)
No	19	37 (42)	52	49	127	35 (34)
I don't know	5	36 (11)	13	22	59	22 (16)
Other	4	5 (9)	1	0	5	1 (1)

The relevance of science courses was examined in the above item. More counselors and teachers, 37 and 49 percent, respectively, said that teachers in their schools do not prefer to teach "pure" as opposed to applied science. Moderate percentages did, however, indicate an emphasis on "pure" science. The response to this item constitutes the strongest evidence of elitism in high school science that was observed; however, no comments indicated that the emphasis on "pure" science was seen as harmful.

Do school counselors discourage students from taking science electives?

	Counselors		10-12 Science Teachers		Students	
	n	%	n	%	n	%
Yes	1	1 (2)	12	17	12	2 (3)
No	43	97 (94)	70	69	286	83 (78)
I don't know	0	0 (0)	17	13	70	15 (19)
Other	2	2 (4)	1	0	1	0 (0)

If you answered "yes," why do counselors do this? (Check as many as you wish)

	10-12 Science Teachers	Students
	n	n
They encourage students to keep their Grade Point Average high	11	7
They do feel science has little to do with getting a job	5	4
They are opposed to anything that is "academic"	0	3
They feel the science teachers prefer small, bright classes	4	6
They are sympathetic to kids who feel that science classes aren't relevant	10	7
Other (please specify)	4	6

There appeared to be substantial agreement that counselors do not discourage students from taking science electives although significantly larger proportions of counselors than teachers said this is so. Of the teachers and students who indicated that counselors do discourage students, the major reasons appeared to be due to the necessity to maintain high grade point averages and sympathy with students who feel science courses are irrelevant.

As you look at science courses in your high school and elsewhere, you probably see things that concern you. Please check those things that you consider to be major problems. (Check as many as you wish)

	Counselors		10-12 Science Teachers		Students	
	n	%	n	%	n	%
Too much time must be spent on remedial mathematics	11	29 (24)	45	63	68	19 (18)
Too much time must be spent on teaching reading	11	15 (24)	37	48	62	11 (17)
Too little attention is given to individual students	16	20 (35)	39	34	189	36 (50)
Too little help is available to the teacher with teaching problems	13	20 (28)	34	41	96	21 (26)
Class periods are too short, classes too large	12	16 (26)	48	62	114	22 (30)
Lab facilities or field arrangements are inadequate	20	73 (44)	49	51	118	34 (32)
The public and administrators are pushing for the wrong things	3	6 (7)	32	45	85	20 (23)
Other	12	25 (26)	17	19	44	23 (12)

The final item on this scenario asked respondents to indicate any major problems with science courses. A large proportion of counselors, 73 percent, said that lab facilities or field arrangements are inadequate, although fewer teachers (51%) and students (34%) agreed. Teachers indicated that too much time is spent on remedial mathematics (63%) and on teaching reading (48%). They also said class periods are too short and classes too large (62%). Over 40 percent would like more help for teachers with teaching problems and 45 percent stated that the public and administrators are pushing for the wrong things. It is important to note the high level of distress on all these items evidenced by the science teachers. Interestingly, fewer students identified major problems with science courses, with one-third indicating that too little attention is given to individual students and a similar proportion agreeing with the previous comment on lab facilities.

RESPONSES TO SCIENCE EDUCATION GENERAL QUESTIONS

The last page of the four page questionnaire was designed to contain items that were of broad interest to all respondent samples. The distinct fourth pages were constructed, each was printed on one-third of the questionnaires, and they were randomly administered to respondents from each group. This procedure permits the assessment of larger samples on selected issues of wide-reaching concern. A copy of each of the fourth page formats is included as an appendix to this chapter.

Samples have been combined in order to analyze these questions. Superintendents and principals from all three grade levels are combined as an administrator group. Supervisors have been combined, as have teachers, disregarding discipline specialty and grade level. Parents and students constitute the last two groups. Counselors responses have been omitted from these groupings. Standard errors may be interpreted from Tables 18-1 and 18-2 in the same manner as previously noted. Unweighted percentages are in parentheses for students and parents.

Response rates for the combined groups are as follows: 234 of 416 administrators (56%), 674 of 1020 supervisors (66%), 530 of 900 teachers (59%), 401 of approximately 736 parents (55%) and 736 students.

Page Four, Format 1: Questions on Public Schools: The first of the three pages of general questions was administered at random to approximately one-third of each group and was responded to by 76 administrators, 228 supervisors, 173 teachers, 126 parents and 245 students for a total sample of 848 persons. The first item asked respondents to identify the biggest problems with which the public schools in their community deal. The most common responses have been tallied and are presented below with the raw frequencies of responses. Up to two responses per person are included in the tally.

What do you think are the biggest problems with which the PUBLIC schools in this community must deal?

Comments	Administrators	Supervisors	Teachers	Students	Parents
	n	n	n	n	n
Budget problems, priorities, tax base	19	46	37	33	18
Student apathy, motivation, absenteeism	7	19	20	39	13
Community apathy, support	9	26	19	6	5
Student discipline	3	7	16	16	19
Teaching quality	2	6	2	19	10
Parental apathy, support	7	14	19	2	4
Curriculum methods	0	17	10	10	7
Racial problems, integration, busing	3	4	3	16	10

The comments on the above free response item were content analyzed after return of the questionnaires; the most commonly mentioned problem was budget problems and priorities and dissatisfaction with the tax base. This problem was the most popular complaint by all the school professionals: administrators, supervisors and teachers. The second most frequently cited problem overall was student apathy, lack of motivation and absenteeism. Students recorded this problem more often than any other and it was the second most popular response from teachers. School personnel were especially concerned with community apathy and lack of support, ranking as the second most common problem by administrators and supervisors, and with parental apathy and lack of support. Supervisors and teachers additionally expressed concern over curriculum methods.

Three issues especially noted by students and parents were general problems with student discipline, the most commonly cited problem by parents; the overall quality of teaching; and problems with integration and busing. Other problems listed with some frequency were lack of respect by students, permissiveness, moral state and values, ranked ninth overall; large classes and over-crowding, listed third by students and tied for tenth and eleventh overall along with the wide range of student interests and needs to be met. Finally, listed twelfth overall and sixth by supervisors was concern with lack of basic skills on the part of students.

Our findings are in general agreement with those of the Ninth Annual Gallup Poll.* Of the eight top problems listed by 1506 adults in that poll, six were among the eight most frequently cited by our respondents. Lack of discipline was number one on the Gallup Poll and number four in our survey. Budget problems, listed most frequently by our respondents, was rated the third largest problem in the Gallup Poll. The two problems in the top eight identified by Gallup and omitted by our respondents were use of drugs (rated sixth) and size of school/classes (rated eighth), although this latter problem was listed fourth by students. Two problems identified in our survey that were not among the top eight in the Gallup Poll were student apathy and community apathy.

> Some of our contemporary social problems are: Health care, poverty, abortion, discrimination, and graft. Some people want the social studies to be taught so that pupils learn how to analyze these problems. Some people want the schools to avoid discussion of offensive social problems. How do you feel?

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*George H. Gallup, "The Ninth Annual Gallup Poll of the Public's Attitudes Toward the Public Schools," Phi Delta Kappan (September 1977): 33-47.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
Elementary school pupils should learn to analyze such problems	39	61	102	57	68	58	63	27 (27)	48	33 (39)
Pupils should be made aware of the problems but "problem analysis" is not a suitable goal for the elementary school social studies program	24	31	67	30	66	33	122	44 (53)	44	27 (36)
Contemporary social problems are not suitable topics for the grade school	4	2	9	5	12	3	25	18 (11)	17	21 (14)
Other	8	7	41	9	18	6	20	11 (9)	15	9 (12)

Scenario Y on Personal Bias in Teaching attempted to discover what a group of parents, students and social studies teachers think about a teacher sharing his or her own personal views in the context of a classroom discussion. The above question was designed for the general purpose of eliciting opinion on the acceptability of teaching including controversial contemporary problems in elementary schools. Approximately 60 percent of administrators, supervisors and teachers tended to agree that elementary school students should learn to analyze such problems while only about 30 percent of seniors and parents felt this way. Thirty percent of school personnel said that elementary students should be made aware of such problems but that "problem analysis" is not a goal for these grade levels. Very small percentages selected the third option that contemporary social problems are not suitable topics for the grade schools. Over 40 percent of the students and one-fourth of the parents said that pupils should be made aware of the problems but about 20 percent of these groups felt that these problems are not suitable for grade school.

Should all high school students in the United States be required to pass a standard examination in order to get a high school diploma?

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
Yes, they should	30	42	99	56	104	66	105	54 (44)	78	69 (63)
No, they should not	32	40	88	36	42	19	108	33 (45)	40	27 (32)
I don't know	12	17	32	8	26	15	28	14 (12)	6	3 (5)

Should school districts require some minimum competency level in science for all students to attain in order to graduate from high school?

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
Yes, they should	37	37	121	70	105	67	108	46 (46)	73	67 (59)
No, they should not	26	37	76	23	37	17	100	40 (42)	42	31 (34)
I don't know	10	26	26	8	28	16	28	14 (12)	8	2 (7)

The subject of minimum competencies was investigated in the next two items. Six states have already passed legislation requiring minimum competency for high school graduate while the subject is under serious consideration in another 12 states. In addition, in 10 states the requirements have been changed by the state board of education. In a recent survey in Georgia, Schab found that the following percentages agreed with the requirements of twelfth grade competencies in reading, writing, listening, speaking and arithmetic skill: students (43%), parents (60%), teachers (31%), and administrators (13%, although a larger proportion, 32% agreed with requiring eighth grade competencies).*

Our results indicated a generally higher level of acceptance of minimum competency requirements although it must be noted that the above items are not as specific in the level of required competency as was the question posed by Schab. Parents were the group in highest agreement (69%) with administrators being the most opposed (42%).** It might have been anticipated that a smaller response rate would be obtained when asked if minimum competencies in science should be required, but this was not the case, except for small but not significant decreases for administrators, students and parents. Of special interest is the 14 percent increase in agreement by supervisors. On both questions, larger proportions of administrators said they are undecided.

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*Schab, Fred, "Who Wants What Minimal Competencies?" Phi Delta Kappan 59 (January, 1978): 350-52.

**The response from administrators was not entirely consistent with field observations that many administrators were seeking to establish technical requirements for better management of the schools. See Chapter 17.

What are the major criticisms of the textbooks that are being used in your school? (Check as many as you wish)

	Administrators		Supervisors		Teachers		Students			Parents		
	n	%	n	%	n	%	n	%		n	%	
Out-of-date	16	10	43	13	27	17	131	42	(54)	35	30	(28)
Simplistic	6	11	14	5	17	3	16	3	(7)	2	1	(2)
Sex-biased	5	12	12	5	4	6	13	3	(5)	6	2	(5)
Reading level too difficult	34	59	123	43	76	55	42	26	(18)	15	16	(12)
Concepts too difficult	10	14	47	13	26	11	49	20	(20)	14	17	(11)
Inadequate Teacher Guide	4	15	32	10	24	15	30	7	(13)	16	7	(13)
Poorly related to tests used	8	21	32	9	12	22	71	16	(30)	18	18	(14)
Poorly related to later courses	4	7	34	14	13	8	68	18	(28)	24	11	(19)
Too many trivial lessons	12	19	34	16	27	14	68	27	(29)	20	9	(16)

We were interested in the major criticisms of textbooks that are in current use. Many teachers during the case study site visits had indicated that the reading level of many texts was too difficult. It was felt that responses to this item might provide insights into future directions for text and material development. Our results indicated a wide diversity of opinion on this question. Administrators, supervisors and teachers selected "reading level too difficult" over twice as often as any other response; yet a much smaller proportion of students (26%) and their parents (16%) indicated that this is a major problem. Students criticized the texts as being out-of-date and said that they contain too many trivial lessons. Approximately one-fifth of the teachers and administrators stated that texts are poorly related to tests. Apparently, the question of sex biasedness is not seen as a problem with current texts.

The next three items asked for opinion on the overall quality of science, mathematics and social studies programs. Respondents were requested to rate each program on a four point scale with excellent=1 and poor=4.

Even though it cannot really be summed up in a word, what do you feel is the overal quality of the high school science program in your district?

	Administrators		Supervisors		Teachers		Students			Parents		
	n	%	n	%	n	%	n	%		n	%	
Excellent	14	15	21	10	20	22	20	5	(8)	9	4	(7)
Very good	25	22	109	64	89	50	93	44	(39)	41	28	(33)
Satisfactory	25	58	56	22	42	16	111	46	(46)	59	56	(48)
Poor	1	4	5	1	8	4	11	4	(5)	10	9	(8)
Other	4	3	13	3	7	8	4	2	(2)	4	3	(3)

What do you feel is the overall quality of the high school math program?

	Administrators		Supervisors		Teachers		Students			Parents		
	n	%	n	%	n	%	n	%	(%)	n	%	(%)
Excellent	11	6	25	26	20	12	36	25	(16)	11	4	(9)
Very good	27	39	103	40	71	56	99	43	(43)	44	39	(36)
Satisfactory	26	44	57	28	53	25	85	28	(37)	56	39	(46)
Poor	2	7	8	4	9	2	10	4	(4)	9	18	(7)
Other	3	5	11	3	4	5	3	1	(1)	1	0	(1)

What do you feel is the overall quality of the high school social studies program?

	Administrators		Supervisors		Teachers		Students			Parents		
	n	%	n	%	n	%	n	%	(%)	n	%	(%)
Excellent	6	5	14	10	9	3	33	11	(14)	8	3	(7)
Very good	25	32	89	38	64	48	87	47	(37)	42	39	(35)
Satisfactory	33	56	67	43	61	31	102	38	(43)	58	50	(48)
Poor	3	6	14	4	8	5	11	4	(5)	10	7	(8)
Other	3	1	15	4	10	13	4	0	(2)	2	0	(2)

In general, the overall quality of all programs was rated satisfactory to excellent by overwhelming majorities of all respondent groups. Teachers and supervisors gave higher ratings to science and mathematics than to social studies programs. Administrators and parents rated the quality of all three programs quite similarly while students tended to rate the mathematics program highest. The responses are collapsed below for easier interpretation. Weighted median ratings were computed omitting the "other" responses; a lower median rating indicates a higher overall rating of the program. The table below illustrates that median ratings by supervisors and teachers placed all programs in the very good range. Even the lower ratings of administrators and parents were still in the high "satisfactory" range.

	Administrators		Supervisors		Teachers		Students			Parents		
	n	%	n	%	n	%	n	%	(%)	n	%	(%)
Rated excellent or very good												
Science	39	46	130	74	109	72	113	49	(47)	50	32	(40)
Mathematics	38	44	128	65	91	68	135	68	(59)	55	43	(45)
Social Studies	31	37	103	48	73	52	120	58	(51)	50	43	(42)
Median rating (weighted)												
Science	2.7		2.1		2.1		2.5			2.8		
Mathematics	2.6		2.1		2.2		2.1			2.7		
Social Studies	2.7		2.5		2.5		2.3			2.6		

On the question of the overall quality of education received by most youngsters today, only small proportions indicated they were highly satisfied. The satisfaction was higher among administrators and supervisors than among teachers, students and parents. A majority of all groups reported having mixed feelings. Approximately 30 percent of teachers, senior students and parents said they were quite dissatisfied.

How do you feel about the quality of education most youngsters get today?

	Administrators		Supervisors		Teachers		Students			Parents		
	n	%	n	%	n	%	n	%		n	%	
Quite satisfied	31	27	59	20	24	13	21	3	(9)	16	7	(13)
Mixed feelings	41	62	140	75	109	50	165	68	(71)	72	54	(59)
Quite dissatisfied	4	11	20	5	31	33	38	28	(16)	33	39	(27)
I don't know	0	0	0	0	4	5	9	2	(4)	1	0	(1)
Other	1	0	0	0	0	0	1	0	(0)	1	0	(1)

Name one thing for which the PUBLIC schools deserve more praise than they usually get.

Comments	Administrators	Supervisors	Teachers	Students	Parents
	n	n	n	n	n
Concern for individuals and trying to meet a wide range of needs	12	31	24	11	17
Dedication and efforts of personnel	4	22	28	3	12
Educating children, general comments and teaching basic skills	5	19	9	18	5
Turning out good citizens	3	17	10	12	8
Operating as well as they do, managing with budget restrictions	5	17	8	13	7
Really trying, even though the impossible is expected	5	18	9	9	5
Good teaching, teacher competence	2	5	8	16	5
Discipline, social development, compensating for what is missing in the home	6	6	9	7	7

Content analysis of the responses to the above item was performed after the questionnaires were returned. A concern for individual students and the efforts to meet a wide range of student needs was mentioned most often overall as the one thing for which public schools deserve more praise; it was also the most frequent response by administrators, supervisors and parents. Second in frequency of mention overall was the dedication of personnel, including the time and effort they expend. Teachers made this comment more than any other. The third and fourth most commonly cited areas deserving praise were general remarks on educating children and teaching them basic skills, especially noted by supervisors and the most frequent response of students; and general comments on turning out good people and citizens prepared for life. Other remarks included schools operating as well as they do and managing with budget restrictions as well as the effort that school personnel really make, even when the impossible is expected. Good teaching and teacher competence were especially noted by students and there was general acknowledgement of teacher efforts in the areas of discipline and social development. A substantial number of students, 16, mentioned the quality of the extra-curricular programs, including art, music and sports as a good thing about schools.

It is perhaps worth indicating some of the general areas that did not receive much praise from our respondents. Only 13 overall listed the curriculum and this included no administrators or teachers. Only 2 students and 2 parents mentioned the facilities as worthy of praise and a total of 5 respondents, including 4 administrators, said that schools should be commended for getting parents involved and promoting community support.

Page Four, Format 2: Concerns About Education Today. The second of the three pages of general interest questions contained 12 items to which respondents were asked to indicate true, false or I don't know and a list of possible funding projects from which three should be selected. This page was also randomly administered to approximately one-third of each group and was responded to by 77 administrators, 243 supervisors, 179 teachers, 251 senior students and 144 parents for a total sample of 894 persons.

The true-false responses to each item are reported below and, as such, are very easy to interpret. Only findings of special interest are highlighted following the questions.

Teachers seldom use TV, museums, and community resources to supplement teaching.

	Administrators		Supervisors		Teachers		Students			Parents		
	n	%	n	%	n	%	n	%	(%)	n	%	(%)
True	22	19	81	34	58	26	167	69	(67)	62	24	(44)
False	55	81	154	66	109	68	70	28	(28)	72	74	(51)

Students would get a better education if there were regular discussions and firm curricular arrangements between teachers at different grade levels.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
True	61	60	220	93	144	75	168	66 (68)	114	75 (83)
False	6	19	9	1	19	19	26	15 (11)	9	3 (7)

The schools have been creating "new" courses and having students work on topics of their own choosing. As a result of these and other circumstances, the schools give too little emphasis to the basic knowledge and skills that every youngster should learn.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
True	30	55	123	71	98	57	88	42 (36)	90	64 (64)
False	34	39	81	25	48	23	126	35 (51)	39	30 (28)

The general public does not put high priority on the <u>teaching</u> of science.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
True	34	59	120	54	78	50	123	59 (50)	80	48 (57)
False	31	18	98	42	69	37	74	27 (30)	48	47 (34)

The general public does not put high priority on the <u>teaching</u> of math.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
True	9	4	41	23	36	19	74	36 (30)	46	29 (33)
False	66	95	190	76	121	75	128	45 (52)	90	69 (64)

The general public does not put high priority on teaching social studies in a way that emphasizes a scientific approach to studying social issues.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
True	55	82	185	79	105	65	121	40 (50)	80	58 (60)
False	12	11	23	9	17	7	56	28 (23)	26	17 (19)

Tight budgets have caused schools to cut back on purchases of textbooks and materials so that it is lowering the quality of instruction.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
True	26	36	96	35	86	38	136	61 (56)	60	35 (43)
False	43	61	118	59	77	55	74	26 (30)	63	53 (45)

For most teachers the most basic goals are attitudinal or moral in character. Subject matter is more a vehicle than an objective in its own right. Mastery of subject matter is sought, but rule-following (social and academic) is more basic.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
True	22	13	74	37	69	34	129	50 (53)	61	41 (46)
False	40	63	126	57	59	46	50	14 (21)	40	29 (30)

Authorities are urging teachers to be more specific about instructional goals. If curriculum guides and lessons do get much more specific, the curriculum will over-emphasize simplistic skills and memorization of isolated facts.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
True	27	38	99	41	74	44	125	42 (52)	52	18 (39)
False	38	41	109	53	68	42	66	38 (27)	50	44 (38)

The role of the high school science department today is simply to provide one biology course for all students and 2-3 other courses for the college-bound students.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
True	19	37	63	23	46	28	123	50 (50)	77	56 (56)
False	48	45	138	73	84	39	90	27 (37)	39	37 (28)

Our school district does not seem to be able to obtain objective evidence of student achievement that would persuade a skeptical visitor that the science teaching here is clearly effective.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
True	22	30	85	41	53	26	88	26 (37)	48	35 (36)
False	38	54	112	42	67	34	85	43 (36)	49	33 (36)

Teachers do not have master teachers available, nor coordinators, nor consultants, nor teacher networks to help them when they need help with their teaching.

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
True	33	52	94	49	81	41	88	48 (36)	55	26 (41)
False	41	48	135	48	77	37	85	27 (35)	47	42 (35)

Respondents felt that firm curricular arrangements between teachers at different grade levels would result in better education (60 to 90% agreement); that specification of curricular goals will lead to over-emphasis of simplistic skills and memorization of isolated facts (38 to 52% disagreement); and that the school district does not have objective evidence of clearly effective science teaching (26 to 41% agreement).

Three items were directed toward the high priority placed by the public on the teaching of science, mathematics and social studies. In general, respondents agreed that a high priority is not placed on the teaching of science (48 to 59%) and on teaching social studies in a way that emphasizes a scientific approach to studying social issues (57 to 81%), except for students with only 40 percent agreeing to the latter statement. Percentages were almost reversed for the teaching of mathematics with large proportions saying that a high priority is placed on the teaching of these subjects. It is not difficult to understand the higher priority assigned to mathematics. Responses to an earlier question in Scenario V on Back-to-the-Basics indicated that reading and arithmetic are prerequisite skills for later course work.

Only students agreed that substantial use is made of TV, museums and other community resources and that tight budgets have resulted in cutbacks on the purchase of texts and materials. There was less agreement among students that "new" courses have resulted in less emphasis on basic knowledge and skills (only 42 percent compared to over half of all the other respondent groups).

The mastery of subject matter was seen as more important than social and academic rule-following by substantial proportions of school people (46 to 62%) but only 29 percent of parents and 14 percent of students responded in this way. The role of the science department is also in question. Approximately half of the students and teachers reported that this role is simply to provide a biology course for all students and 2 to 3 other courses for college-bound students, while only 23 percent of supervisors and 28 percent of teachers said this is the case. Finally, school personnel were almost evenly split over whether or not there are adequate consultants or teacher networks available to assist teachers with their teaching problems.

The final question for this group was a list of projects some people think should be federally funded from which three were to be selected. It was our hope that the results to this item might provide direction to the National Science Foundation in the kinds of programs viewed as deserving support.

If the federal government were going to do more to support science teaching in the schools, what do you think it should do? In the following list please check three that you feel are most worthy of funding.

	Administrators		Supervisors		Teachers		Students			Parents		
	n	%	n	%	n	%	n	%		n	%	
Additional research on science teaching & learning	21	22	69	20	38	16	92	38	(37)	44	25	(31)
Hire and pay resource people to help teachers with their teaching skills	38	57	118	47	60	31	58	14	(23)	43	26	(31)
Provide free telephone networks for teachers to help other teachers	5	2	10	4	11	4	22	6	(9)	8	12	(6)
Provide additional institutes for the improvement of teaching	38	46	150	61	73	31	66	24	(26)	35	32	(25)
Develop "basic math" workbooks and materials	8	13	32	19	49	35	38	17	(15)	43	46	(31)
Develop science courses oriented to present and future job markets	34	46	98	45	92	51	141	52	(56)	72	37	(51)
Undertake a public campaign to promote "scientific literacy"	14	17	50	18	30	17	24	6	(10)	16	13	(12)
Provide textbooks to schools at low cost or no cost	14	21	27	16	34	18	77	38	(31)	35	33	(25)
Provide films and lab materials to schools at low cost or no cost	37	73	80	39	92	53	158	65	(65)	68	56	(49)
Subsidize the early retirement of ineffective teachers	7	4	20	11	12	9	34	13	(14)	16	14	(11)
Provide awards for outstanding teaching	19	12	31	18	21	8	36	24	(15)	31	20	(22)

There was little support by any group to provide free telephone networks for teachers or to subsidize the early retirement of ineffective teachers. Only small proportions selected providing awards for outstanding teaching or undertaking a public campaign to promote "scientific literacy."

The two suggestions receiving the most support were providing film and lab materials to schools at little or no cost (39 to 72%) and developing science courses that are oriented to present and future job markets (37 to 52%). Administrators and supervisors additionally checked hiring resource people to assist teachers with problems (56 to 47%) and providing institutes to improve teaching (46 to 61%). Smaller proportions of students (38%) said it was desirable to provide low or no cost textbooks and to support additional research on science teaching and learning. Teachers (35%) and parents (46%) suggested the development of "basic math" workbooks and materials as worthy of federal support.

Page Four, Format 3: Purposes of Education. Basic to many of the issues raised in the case studies and addressed both by their authors and the subsequent survey is the main purpose of our schools. Gooler* attempted to determine what the goals of our educational systems should be. One category of goals he studied was the "very broad purposes of education, primarily couched in terms of what the student should experience or do in a school, as well as what he should become." Gooler selected the human, knowledge and career purposes of education as the three broad areas to investigate. His questions and the general format were reproduced and administered at random to approximately one-third of each respondent group. Results are based upon the answers of 81 administrators, 203 supervisors, 178 teachers, 240 students and 131 parents for a total sample of 833.

The HUMAN purpose of Education

The main responsibility of the schools should be to experience what human society is--the history, human values, work and play, the arts and sciences, what men and women have accomplished and what they have failed to accomplish. The schools should give students the opportunity to be a participant in the human experience, the aesthetic and emotional experience as well as the intellectual experience.

The statement directly above tells us--in my opinion--what should be

	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
The most important task of the schools	25	36	55	27	53	39	90	30 (39)	31	18 (25)
An important tasks, but not the most important tasks of the schools	50	52	135	69	113	58	121	52 (52)	80	64 (64)
A relatively unimportant tasks of the schools	3	12	6	4	7	3	18	16 (8)	10	17 (8)
A task that the schools should not undertake	0	0	0	0	2	1	3	2 (1)	4	1 (3)

The KNOWLEDGE Purpose of Education

The main responsibility of the schools should be to help young men and women know all about the world. Each student should have maximum opportunity to study the basic facts and concepts of nature, technology, commerce, the languages, the fine arts and practical arts. The schools should help young men and women build skills for explaining--and even discovering--new knowledge.

*Gooler, Dennis, "Strategies for Obtaining Clarification of Priorities in Education," (Ph.D. diss., University of Illinois, 1970).

The preceeding statement tells us--in my opinion--what should be

	Administrators		Supervisors		Teachers		Students			Parents		
	n	%	n	%	n	%	n	%		n	%	
The most important task of the schools	28	36	88	62	72	44	98	45	(42)	65	49	(51)
An important task, but not the most important tasks, of the schools	47	54	107	38	100	56	126	51	(54)	57	46	(45)
A relatively unimportant tasks of the schools	3	10	0	0	2	0	5	1	(2)	4	4	(3)
A task that the schools should not undertake	0	0	0	0	1	0	3	2	(1)	1	1	(1)

The CAREER Purpose of Education

The main responsibility of the schools should be to prepare young people for their life-work. Though most careers require training on the job and continuing education throughout life, the schools should lay the foundation for successful work. For students who will take further training in technical schools or professional college, the schools should emphasize entrance requirements and preparatory skills.

The statement directly above tells us--in my opinion--what should be

	Administrators		Supervisors		Teachers		Students			Parents		
	n	%	n	%	n	%	n	%		n	%	
The most important task of the schools	20	19	44	31	65	25	107	48	(46)	86	78	(68)
An important task, but not the most important task, of the schools	53	81	143	66	103	71	113	48	(49)	39	21	(31)
A relatively unimportant task of the schools	4	1	8	3	4	2	10	4	(4)	2	1	(2)
A task that the schools should not undertake	0	0	1	0	2	1	2	1	(1)	0	0	(0)

There was general agreement among all groups that all three of the purposes of education - human, knowledge and career - are important. It is apparent that some people selected more than one purpose as the most important task of the schools (since percents do not sum to 100 within each response group). The weighted median rankings of each group are presented below.

	Weighted Median Rank		
	Human	Knowledge	Career
Administrators	1.8	1.8	1.9
Supervisors	1.8	1.4	1.7
Teachers	1.7	1.6	1.8
Students	1.9	1.6	1.5
Parents	2.0	1.5	1.1

The most important task was assigned rank = 1 and a task the schools should not undertake was assigned rank = 4; thus a lower number indicates a higher ranking. The ratings of the HUMAN purpose and the KNOWLEDGE purpose of education were tied for the highest priority of schools by administrators, while supervisors and teachers both assigned the highest priority to KNOWLEDGE purpose. These results are consistent with Gooler's research in which three of four teacher groups selected the KNOWLEDGE purpose.* Both students and parents, on the other hand, selected the CAREER purpose of education with the KNOWLEDGE purpose being rated second. The CAREER purpose was rated second by supervisors and third by both administrators and teachers. The ratings given by both administrators and teachers were very close in value; parent ratings resulted in the greatest discrimination among the three purposes.

After rating each purpose as above, the respondents were asked how the three purposes are currently being emphasized in their schools.

How are these three purposes now being emphasized in your school(s)?

The HUMAN purpose	Administrators		Supervisors		Teachers		Students		Parents	
	n	%	n	%	n	%	n	%	n	%
Only a little	12	32	49	19	63	22	106	44 (47)	35	52 (31)
Quite a bit	43	54	126	58	89	61	85	42 (38)	57	34 (50)
More than the other 2	18	14	16	6	17	15	25	10 (11)	17	9 (15)
Far more than the other 2	1	0	5	16	3	2	9	4 (4)	5	4 (4)

*Dennis Gooler, "Strategies for Obtaining Clarification of Priorities in Education," (Ph.D. diss., University of Illinois, 1970).

The KNOWLEDGE purpose	Administrators		Supervisors		Teachers		Students			Parents		
	n	%	n	%	n	%	n	%		n	%	
Only a little	5	4	10	7	23	10	36	14	(16)	18	9	(15)
Quite a bit	38	49	83	33	81	43	109	51	(48)	55	67	(47)
More than the other 2	24	27	76	39	50	37	58	28	(25)	34	19	(29)
Far more than other 2	7	20	27	21	15	10	25	8	(11)	11	5	(9)
The CAREER purpose												
Only a little	18	32	57	26	43	35	42	14	(18)	35	29	(29)
Quite a bit	41	38	95	45	83	48	78	33	(34)	50	25	(42)
More than the other 2	8	23	32	11	31	9	60	35	(26)	22	40	(19)
Far more than other 2	7	6	12	17	14	8	48	18	(21)	12	7	(10)

A larger proportion of administrators, supervisors and teachers indicated that the KNOWLEDGE purpose is receiving the most emphasis in their schools. Students and their parents stated that the CAREER purpose is receiving the most emphasis. Thus, our respondents appear to believe that the reality is consistent with their opinion of which purpose should be important. The weighted median ratings presented below indicate, however, a wider range of ratings among the three purposes within each group than were evident on the "purpose" questions. Again, a lower rating indicates a higher priority.

	Weighted Median Rating		
	Human	Knowledge	Career
Administrators	2.2	1.6	2.0
Supervisors	1.8	1.3	1.8
Teachers	2.0	1.6	2.2
Students	2.4	1.8	1.4
Parents	2.5	1.9	1.6

SUMMARY

Case Studies in Science Education (CSSE), sponsored by the National Science Foundation, was one of three projects funded in 1976 to assess the status of science education in American schools. CSSE consisted of three distinct phases: on-site observation of case studies of conditions and characteristics of science education in eleven school districts by an experienced ethnographer; site visits to the same eleven districts by project personnel and specialists in science education; and a national survey to corroborate case study findings.

The original intent to use the survey to confirm case study findings was thwarted by the difficulty of representing complex local circumstances in survey language. No particular major findings from the case studies were refuted by the survey and the general tone of conditions regarding science education in the schools was, in fact, consistent between the two data sources.

The present chapter presents findings from the national survey of district superintendents, principals, curriculum supervisors, teachers, high school counselors, senior students and their parents. Demographic and experienced-related questions, specially devised scenarios each consisting of an illustrative situation and questions, and general items on science education were included in a four page questionnaire that was designed in 66 versions to relate to specific samples of respondents. The superintendent, principal, supervisor and teacher samples were selected by Research Triangle Institute following rigorous and traditional sampling procedures. Follow-up procedures included a postal card reminder and a second questionnaire. The counselor, student and parent samples were selected by CSSE project personnel following telephone contact with principals of schools with grades 10 through 12. Counselors were not followed up. Students and parents were surveyed by obtaining the cooperation of 27 counselors in selecting a representative senior class and having each student present on the day of administration complete a questionnaire. Parents of these same students were mailed questionnaires and contacted for follow-up by the cooperating counselors.

The questionnaires contained both categorized and free response items. The former were computer analyzed; raw frequency and weighted response percentages were reported (along with unweighted percentages for counselors, students and parents). The free response items were primarily content analyzed manually and only frequency tabulations were reported in most cases.

Any attempt to summarize the responses of 22 separate groups on a large number of issues involving over 800 distinct questions could be described as foolhardy. The data have been collapsed in presenting the results thus far and any further reduction seems counterproductive. Thus, although major findings will be highlighted on the following pages, it must be kept in mind that many important insights are neglected or insufficiently emphasized. In addition, the results of each case study are written as a separate chapter in the present report. Other chapters contain an assimilation of case study and survey findings and an executive summary is presented in Chapter 19. The reader of this chapter is encouraged to peruse the remainder of this report in order to place the survey findings in a proper perspective.

Description of Response Groups. Response rates of approximately 60 percent overall were achieved. Respondents included one superintendent sample (n=74); three principal samples of elementary (n=59), grades 7 through 9 (n=47) and grades 10 through 12 (n=54); five supervisor samples of K through 6 science (n=134), K through 6 mathematics (n=116), 7 through 12 science (n=139), 7 through 12 mathematics (n=132) and 7 through 12 social studies (n=153); one counselor sample (n=46); seven teacher samples of K through 6 (n=78), 7 through 9 science (n=93), 7 through 9 mathematics (n=81), 7 through 9 social studies (n=42), 10 through 12 science (n=101), 10 through 12 mathematics (n=94) and 10 through 12 social studies (n=41); two senior samples (n=361 and 375); and three parent samples (n=111, 142 and 148).

The school personnel respondents were generally quite experienced. High school principals reported the least amount of experience in their present positions, a weighted average of 5.5 years; mathematics teachers of grades 7 through 9 were the most experienced with a weighted average of 12.7 years in teaching.

The weighted average enrollment of the school districts was 4600 students according to the superintendent responses. Our principals reported average school enrollments as 390 in elementary schools, 580 in grades 7 through 9 and 760 in grades 10 through 12, respectively. Estimates of annual per pupil expenditures ranged from averages of $936 to $1250.

A substantial majority of the curriculum supervisors, ranging from 62 to 96 percent in the five subsamples, indicated that their primary responsibility is something other than curriculum supervisor. Many were teachers or administrators and, as a whole, devoted less than one-half of their time to supervising activities.

The most commonly taught courses, according to our teacher respondents, were general science, general math and American history in grades 7 through 9; biology, algebra (followed closely by geometry) and American history in grades 10 through 12. The courses most frequently taken by high school students were reported by our seniors as American history, algebra, biology, geometry, general science, and basic math. In the high schools, 25 percent of the science teachers said they were currently teaching chemistry or physics but only 12 percent of math teachers were teaching advanced math courses and similar proportions of social studies teachers reported teaching psychology (11%) or sociology (7%).

Approximately one-third of the supervisors indicated they had attended National Science Foundation institutes, except for secondary science supervisors of whom 60 percent reported having participated. The percentages of teachers who had been involved in NSF institutes ranged from 10 percent of secondary social studies teachers to 46 percent of secondary science teachers. However, this latter group reported the lowest average number of institutes attended for all groups.

Seventy percent of our student samples indicated that they plan to be in college next year. As a total group, they said social studies courses were most in-

teresting but also overemphasize facts and memorization. More of them said that math classes stress basic facts and are too much aimed at "bright" kids. Science courses, along with those in math and social studies were viewed as boring by approximately one-third of the students.

Parents of seniors were, in general, well educated; 85 percent had finished high school and over 30 percent reported having completed college. Over 70 percent said they consider themselves politically conservative or middle-of-the road. Almost all reported that they pay at least a small amount of attention both to their students' work and problems of the schools.

Summary of Scenarios. Eight scenario situations and attendant questions were devised to depict current issues or problems in science education. Each was administered to two or more respondent groups.

Scenario S on budget cuts asked superintendents, science supervisors (grades 7 through 12) and one group of parents to react to various consequences of funding constraints. A majority of superintendents and parents reported no recent budget cuts and larger proportions of all groups indicated that any such cuts had no adverse effect on the science curriculum. In a similar question in another scenario, larger proportions of social studies teachers, students and parents reported budget cuts; 30 percent of these teachers said that class size had been increased and one-fourth stated that there is now more textbook teaching. When asked to select the most acceptable actions they would take in response to budget cuts, all three groups would eliminate extra-curricular activities. The least attractive options were elimination of physics and chemistry courses and of the locally funded assistance to handicapped children. When queried about vocational goals of science courses, there was a general tendency to suggest that science courses be more vocationally oriented; yet large majorities would select a good general education over a good vocational education if forced to choose between the two.

Responding to questions on Scenario T, approximately half of the science supervisors (grades K through 6), principals (grades 10 through 12) and one group of parents indicated opposition to a higher degree of uniformity in the curriculum. Over three-fourths agreed that uniformity could be an obstacle to providing flexible education programs. Most indicated that the goals of traditional and objective-based curricula are similar and that these two approaches do not compete for funds. In another part of the questionnaire, one-third of all survey respondents were asked if more specific curriculum guides and lessons would lead to an over-emphasis on simplistic skills and memorization of facts. All groups were almost evenly split on this question except parents who indicated that greater specificity would not result in the above outcomes. The most popular reasons for clarifying what is taught in each grade were to make teachers' jobs more manageable and to make goals clear to students. When one-third of all survey respondents were asked if regular discussions and firm curricular arrangements between teachers would result in a better education for students, they overwhelmingly supported this idea.

The back-to-the basics movement was one of the most important issues investigated, both in the case studies and in the survey, and was the topic in Scenario U. Over 60 percent of both social studies supervisors (grades 7 through 12) and mathematics teachers (grades 10 through 12) and over 70 percent of elementary school principals replied that this is an important issue. Many indicated that there should be greater emphasis on basic skills. A majority of each group indicated that, although science is basic, the 3 R's must be taught first; however, small proportions of supervisors and principals said that people who stress the 3 R's do not understand today's need for education. When asked the amount of attention that is needed on prerequisite skills, course objectives, abstract concepts, facts and rules, and setting proficiency levels, only one item, emphasis on facts and rules, was felt to need less attention--and that only by the supervisors. In response to why students are graduating from high school unprepared in reading and arithmetic, major reasons were that government regulations were making schools promote unqualified students and that schools push poor learners through to get rid of them. Textbooks were seen as adequate and teachers as competent by a majority of each group.

An issue of importance to all teachers is how to teach abstract concepts and logic. A situation in which a child correctly answers a math question in terms of fractions but not in decimal form was used to illustrate this problem in Scenario V. Math supervisors (kindergarten through grade 6) and math teachers (grades 7 through 9) said that teacher centers or a network of fellow teachers would provide welcome help in dealing with such problems. There was an expressed concern for assistance in methods of teaching mathematical concepts and a general satisfaction with teacher levels of content expertise. Both groups indicated that students have been promoted without knowing basic mathematics. They agreed that teachers feel it is their primary responsibility to prepare children for the next year, even at the expense of reducing the amount of time spent on the broader aims of education.

Field observers noted that some teachers concentrate on drills and worksheets in order to keep children occupied in the classroom; others opt for individualized instruction. In response to Scenario W on socialization and classroom behavior, a majority of principals (grades 7 through 9) and elementary school teachers agreed that teachers are concerned about keeping pupils busy and productive. Surprisingly large proportions, 29 percent of principals and 42 percent of the teachers, said that teaching children to be considerate, respectful and to follow directions is more important than having students understand subject matter content; almost none said it was less important. A similar question stated that mastery of subject matter is important, but rule-following (social and academic) is a more basic goal of teachers and was asked of one-third of all survey respondents. Approximately 35 percent of supervisors, teachers and parents agreed that this is true. With regard to pupils seeing teachers make mistakes, large percentages said it is very definitely good and that students should be allowed to discover and discuss the errors. Yet over 70 percent of each group said that less than 25 percent of teacher time is spent in inquiry teaching, primarily because the necessary equipment and supplies are difficult to provide and students have difficulty carrying out inquiries effectively.

Inservice training and support personnel to help with pedagogic problems was the subject of Scenario X responded to by mathematics supervisors (grades 7

through 12) and science teachers (grades 7 through 9). The climate for solving such problems was viewed as good by more supervisors than teachers; a distressing 20 percent of the teachers indicated that "no one cares." Both groups said that teachers can help one another although substantial numbers mentioned that there is not enough time for such helping activities. In another part of the questionnaire, one-third of all survey respondents were asked whether or not teachers have master teachers, coordinators, consultants, etc., available to help them with their teaching. School personnel were almost evenly split in responding to the availability of such resources. More students and fewer parents thought that this kind of help was not available. NSF and similar institutes were seen as valuable with more than half of the teachers expressing a wish for more activities such as these. According to teachers, the best thing universities could do to help them would be develop curricula more appropriate to the times. Supervisors agreed but also suggested courses oriented to teacher needs.

Scenario Y dealt with the teaching of controversial topics in social studies and was administered to social studies teachers (grades 7 through 9 and grades 10 through 12), students and parents. Generally, these people said that teachers said that teachers should communicate to students how they feel on specific issues as long as they indicate their value orientation and also present alternative views. A majority supported the use of federal funds for the development of teaching materials that include controversial topics, especially if it would not cause trouble; one-third of the parents, however, stated that federal monies should never be spent on such projects. The two most common complaints about the social studies curriculum were too much emphasis on facts instead of concepts, especially by 7 through 9 teachers and students, and not enough emphasis on teaching about personal values.

The final scenario, Z, investigated elitism in science and attitudes about science courses. Over 80 percent of the counselors, science teachers of grades 10 through 12 and students responding to this scenario did not feel that science courses are too difficult. They said that dissatisfaction was due to student immaturity or the irrelevance of the subject matter. Forty percent of the students said that teachers want mostly to teach "pure" science rather than how it is used in everyday life. Teachers and students felt the balance between text and lab work is about right while counselors opted for more lab experiences. Over 70 percent agreed that junior and senior science courses are aimed primarily toward college-bound students; about half recommended that more science courses for the "below average" student be offered. In another part of the questionnaire, one-third of all survey respondents were asked if the role of high school science departments is to provide one biology course for all students and 2-3 courses for students going to college. Approximately 25 percent of supervisors and teachers said yes, as did 37 percent of the administrators. Over half of the students and parents also agreed. As a group, the teachers were quite critical of science courses, stating that too much time is spent on remedial math and teaching reading and that classes are too large with class periods too short. Both they and counselors felt that lab facilities and field arrangements are inadequate.

Summary of General Questions. Respondents were combined into 5 major groups of administrators, supervisors, teachers, students and parents. Three sets of

general questions on science education were formulated and each set was administered at random to one-third of the 5 combined respondent groups.

The biggest problem with which public schools must deal was said to be budget priorities. About one-third of another group of respondents indicated that budget cuts had resulted in decreased purchases of textbooks and a lowering of the quality of instruction. Another major problem cited was apathy on all levels--student, community and parents. With students, this leads to a lack of motivation and absenteeism. Student discipline was the problem mentioned by the fourth largest number of people. Some of the best things about the schools were the concern for the individual student's needs and the dedication and effort of school personnel.

Students should be required to pass a standard examination in order to graduate from high school according to the majority of all groups, except administrators of whom 42 percent agreed. These same respondents said that minimum competency levels in science should also be required, with proportions quite similar to those on the first question.

The overall quality of science programs was responded to by one of the three sets of combined groups and the priority placed on teaching was indicated by a second set of combined groups. Administrators and parents tended to rate science, mathematics and social studies programs as having similar quality while supervisors and teachers rated the first two programs higher than social studies. Students gave mathematics the highest rating with social studies second. A slight majority of the second set of combined groups tended to agree that the public does not put high priority on the teaching of science. Substantially higher proportions of all groups except students felt the same about the teaching of social studies in a way that emphasized a scientific approach to studying social issues. In the case of mathematics, however, all groups and over 75 percent of the school personnel indicated that a high priority is placed on the teaching of this subject. This emphasis on the teaching of mathematics is puzzling unless we assume that math is seen as part of the "basic" skills--definitely an area of concern to our respondents. This same group responded "yes" by a ratio of about 2 to 1 to a statement that schools give too little emphasis to the basic knowledge and skills that every youngster should learn, except for students who were more evenly split. And, in Scenario U, there was evidence for supporting increased teaching emphasis in this area.

The school personnel among our respondents would support the use of federal funds to hire and pay resource people and to provide additional institutes for the improvement of teaching. All groups approved of such funds to develop science courses oriented to present and future job markets and to provide films and lab materials at low or no cost to schools.

One set of the combined groups responded to a series of questions on the general purposes of education. Supervisors and teachers both rated the knowledge purpose highest; students and parents selected the career purpose most frequently.

Administrator responses were close on all three purposes, but gave slightly higher ratings to the human and the knowledge purposes of education. When asked how these purposes were currently being emphasized in their schools, all school personnel groups said that the knowledge purpose is given greatest emphasis; students and parents again indicated that it was the career purpose.

Conclusion. How do people feel about science education in America today? Are there problems? Are they solvable? What are the strengths? the weaknesses? Do administrators feel differently from teachers? school personnel from students and parents? What programs are needed?

These are some of the questions in the minds of those concerned with science education. This chapter has presented information collected by a national survey from different types of school personnel, students and parents that provides partial answers to these questions. What can be said after all these data have been collected, collated, tabulated, analyzed and interpreted? A few comments seem permissible.

It must be noted that the findings reported thus far do not exhaust those possible from the data. The present chapter has concentrated on total group responses; no attempt has been made to compare responses from different geographic areas or from persons with different kinds of experiences. Thus the following comments are based upon general impressions and it is recognized that additional insights might be obtained with further massaging of these data.

According to the survey responses, budget cuts have been real and have made their impact felt. This concern was not as pervasive as was anticipated but substantial proportions stated that budget constraints were a real problem. There were no attractive actions to take in the face of these cuts. Some people suggested trimming of extra-curricular and athletic programs. Others said it would be better to cut back a little in all areas rather than make large reductions in any one program.

There was concern about discipline. This topic, along with budget problems, student apathy and lack of community support, was one of the four problems most commonly mentioned by a cross-section of each group. All respondents were concerned with behavior in the classroom; rule-following and training youngsters to be considerate and respectful were high priorities--some said they were more important than teaching content.

The basics were emphasized. Some people said the emphasis on basic skills of reading and arithmetic was nothing new--they had always given priority to teaching these subjects. Others, however, viewed the back-to-the-basics movement as a return to the important things in education. Our respondents clearly felt that the public places a higher priority on the teaching of mathematics than on the two other areas, science and social studies. This concern was confirmed by the advocacy of minimum competency examinations: students graduating from high school should be capable of demonstrating basic competencies--even in science, according to our respondents.

There appeared to be general satisfaction with the science curriculum. Moderate criticism of current textbooks was accompanied by the request for assistance with the development of more relevant curriculum materials. Texts were seen as important, evidenced by the concentration on textbook teaching as opposed to laboratory and out-of-school experiences. Many teachers noted their desire for more time to devote to curriculum development: specifying course objectives and finding ways to emphasize abstract concepts. While many stated they did not want greater uniformity, there was a clear concern for teaching the skills and concepts needed for the next course or the next grade in school.

Teachers also expressed a desire for more assistance with pedagogic problems. The general quality of content expertise was seen as acceptable, but courses oriented to specific teacher needs were suggested, as was greater availability of teacher consultants. Many of the teachers and supervisors reported having attended a number of institutes and inservice courses; most felt they were useful and many would like more such offerings.

There appeared to be an open-mindedness when it came to teaching style and the inclusion of topics dealing with controversial subjects. The respondents said that teachers have a right to present their own opinions, although they should also discuss alternate views. Substantial numbers indicated that the development of curricular materials dealing with controversial topics was an area worthy of federal funding.

The subject of grouping and tracking was one of concern. While this practice was seen as unfair to some children, it was selected by many as the approach most likely to result in effective instruction. Our respondents seemed to be indicating that grouping was undesirable from the point of view of what is legally right but was almost unavoidable due to heterogeneity of student abilities.

Our respondents recognized the multifaceted purposes of education. They were asked specifically about three: the human, knowledge and career purposes. There were some small differences in the rankings of these three purposes by the different groups. However, in general, the knowledge and career purposes were seen as especially important and the human purpose was not far behind.

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APPENDIX TO CHAPTER 18

What do you think are the biggest problems with which the PUBLIC schools in this community must deal?

Some of our contemporary social problems are: health care, poverty, abortion, discrimination, and graft. Some people want the social studies to be taught so that pupils learn how to analyze these problems. Some people want the schools to avoid discussion of offensive social problems. How do you feel?

___Elementary school pupils should learn to analyze such problems.
___Pupils should be made aware of the problems but "problem-analysis" is not a suitable goal for the elementary school social studies program.
___Contemporary social problems are not suitable topics for the grade school.
___Other:

Should all high school students in the United States be required to pass a standard examination in order to get a high school diploma?

___Yes, they should ___No, they should not ___I don't know

Should school districts require some minimum competency level in science for all students to attain in order to graduate from high school?

___Yes, they should ___No, they should not ___I don't know

What are the major criticisms of the textbooks that are being used in your school? (Check as many as you wish.)

___out-of-date ___reading level too difficult ___poorly related to tests used
___simplistic ___concepts too difficult ___poorly related to later courses
___sex-biased ___inadequate Teacher Guide ___too many trivial lessons

Even though it cannot really be summed up in a word, what do you feel is the overall quality of the high school science program in your district?

___excellent ___very good ___satisfactory ___poor ___other:

What do you feel is the overall quality of the high school math program?

___excellent ___very good ___satisfactory ___poor ___other:

What do you feel is the overall quality of the high school social studies program?

___excellent ___very good ___satisfactory ___poor ___other:

How do you feel about the quality of education most youngsters get today?

___quite satisfied ___mixed feelings ___quite dissatisfied ___I don't know

Please comment if you would like to:

Name one thing for which the PUBLIC schools deserve more praise than they usually get:

People in your community and elsewhere are concerned about education today. On each of the lines below, please help us understand these concerns.

T = Yes, I think the statement is true. ? = I don't know.
F = No, I think that the statement is not true.

_____ Teachers seldom use TV, museums, & community resources to supplement teaching.

_____ Students would get a better education if there were regular discussions and firm curricular arrangements between teachers at different grade levels.

_____ The schools have been creating "new" courses and having students work on topics of their own choosing. As a result of these and other circumstances, the schools give too little emphasis to the basic knowledge and skills that every youngster should learn.

_____ The general public does not put high priority on the teaching of science.

_____ The general public does not put high priority on the teaching of math.

_____ The general public does not put high priority on teaching social studies in a way that emphasizes a scientific approach to studying social issues.

_____ Tight budgets have caused schools to cut back on purchases of textbooks and materials so that it is lowering the quality of instruction.

_____ For most teachers the most basic goals are attitudinal or moral in character. Subject matter is more a vehicle than an objective in its own right. Mastery of subject matter is sought, but rule-following (social and academic) is more basic.

_____ Authorities are urging teachers to be more specific about instructional goals. If curriculum guides and lessons do get much more specific, the curriculum will over-emphasize simplistic skills and memorization of isolated facts.

_____ The role of the high school science dept. today is simply to provide one biology course for all students and 2-3 other courses for the college-bound students.

_____ Our school district does not seem to be able to obtain objective evidence of student achievement that would persuade a skeptical visitor that the science teaching here is clearly effective.

_____ Teachers do not have master teachers available, nor coordinators nor consultants nor teacher networks, to help them when they need help with their teaching.

If the federal government were going to do more to support science teaching in the schools, what do you think it should do? In the following list please check three that you feel are most worthy of funding: (only 3)

_____ additional research on science teaching and learning
_____ hire and pay resource people to help teachers with their teaching skills
_____ provide free telephone networks for teachers to help other teachers
_____ provide additional institutes for the improvement of teaching
_____ develop "basic math" workbooks and materials
_____ develop science courses oriented to present and future job markets
_____ undertake a public campaign to promote "scientific literacy"
_____ provide text books to schools at low cost or no cost
_____ provide films and lab materials to schools at low cost or no cost
_____ subsidize the early retirement of ineffective teachers
_____ provide awards for outstanding teaching

Each of the three paragraphs below has been said to be THE MAIN PURPOSE of our schools.
Which do you think the schools should do?
Please circle one letter below each paragraph.

The HUMAN Purpose of Education	The KNOWLEDGE Purpose of Education	The CAREER Purpose of Education
The main responsibility of the schools should be to experience what human society is--the history, human values, work and play, the arts and sciences, what men and women have accomplished and what they have failed to accomplish. The schools should give students the opportunity to be a participant in the human experience, the aesthetic and emotional experience as well as the intellectual experience.	The main responsibility of the schools should be to help young men and women know all about the world. Each student should have maximum opportunity to study the basic facts and concepts of nature, technology, commerce, the languages, the fine arts and practical arts. The schools should help young men and women build skills for explaining--and even discovering--new knowledge.	The main responsibility of the schools should be to prepare young people for their life-work. Though most careers require training on the job and continuing education throughout life, the schools should lay the foundation for successful work. For students who will take further training in technical school or professional college, the schools should emphasize entrance requirements and preparatory skills
THE STATEMENT DIRECTLY ABOVE TELLS US -- IN MY OPINION -- WHAT SHOULD BE	THE STATEMENT DIRECTLY ABOVE TELLS US -- IN MY OPINION -- WHAT SHOULD BE	THE STATEMENT DIRECTLY ABOVE TELLS US -- IN MY OPINION -- WHAT SHOULD BE
(a) THE MOST IMPORTANT TASK OF THE SCHOOLS.	(a) THE MOST IMPORTANT TASK OF THE SCHOOLS.	(a) THE MOST IMPORTANT TASK OF THE SCHOOLS
(b) AN IMPORTANT TASK, BUT NOT THE MOST IMPORTANT TASK, OF THE SCHOOLS	(b) AN IMPORTANT TASK, BUT NOT THE MOST IMPORTANT TASK, OF THE SCHOOLS.	(b) AN IMPORTANT TASK, BUT NOT THE MOST IMPORTANT TASK, OF THE SCHOOLS.
(c) A RELATIVELY UNIMPORTANT TASK OF THE SCHOOLS.	(c) A RELATIVELY UNIMPORTANT TASK OF THE SCHOOLS.	(c) A RELATIVELY UNIMPORTANT TASK OF THE SCHOOLS.
(d) A TASK THAT THE SCHOOLS SHOULD NOT UNDERTAKE.	(d) A TASK THAT THE SCHOOLS SHOULD NOT UNDERTAKE.	(d) A TASK THAT THE SCHOOLS SHOULD NOT UNDERTAKE.

After you have circled one letter under each box above please answer three more questions:

HOW ARE THESE THREE PURPOSES NOW BEING EMPHASIZED IN YOUR SCHOOL(S)?

the HUMAN purpose:	___only a little	___quite a bit	___more than the other 2	___far more than the other 2
the KNOWLEDGE purpose:	___only a little	___quite a bit	___more than the other 2	___far more than the other 2
the CAREER purpose:	___only a little	___quite a bit	___more than the other 2	___far more than the other 2

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